



★DEVELOPMENTAL TEST AND EVALUATION

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This instruction implements Air Force Policy Directive (AFPD) 99-1, *Test and Evaluation Process*. It provides mandatory procedures for the management of developmental test and evaluation (DT&E) programs on systems, subsystems, and components. It describes planning, conducting, and reporting cost-effective DT&E to support acquisition and sustainment program decisions and actions throughout a system's life cycle. It implements Department of Defense (DoD) Directive 5000.1, *Defense Acquisition*, 15 March, 1996, and Department of Defense Regulation 5000.2-R, *Mandatory Procedures for Major Defense Acquisition Programs (MDAP) and Major Automated Information System (MAIS) Acquisition Programs*, 15 March, 1996. Additional non-mandatory material is contained in the *DoD Acquisition Deskbook*. Use this instruction with the referenced DoD procedures, and Air Force 10-6, 63-series, and 99-series publications. Implementing, operating, and supporting commands or agencies within the Air Force may supplement this instruction. Send draft proposed major command (MAJCOM) DT&E instructions and supplements to HQ AFMC/DOP with an information copy to HQ USAF/TEP. Submit recommended changes to this instruction via AF Form 847, **Recommendations for Change of Publication**, to HQ USAF/TEP with an information copy to HQ AFMC/DOP.

SUMMARY OF REVISIONS

This is an update to AFI 99-101, 22 July 1994, which replaced AFR 80-14 and AFR 80-19. These revisions result from the updated DoD 5000-series (DoDD 5000.1 and DoD 5000.2-R) published on 15 March 1996. The principal revisions are: the acquisition milestones and phases were renamed; ACAT IV and Milestone IV were eliminated; the Analysis of Alternatives (AoA) replaced the Cost and Operational Effectiveness Analysis (COEA); the integrated product team (IPT) became the primary forum for managing all aspects of acquisition programs; the Single-Face-to-Customer offices were realigned; developmental test and evaluation in support of sustainment (after Milestone III) was clarified; the term "specification" was changed to "performance-based requirement" where appropriate; and all definitions and references were updated. New information was added about: the test process; waivers for use of non-government test facilities; certification of readiness for OT&E; the deficiency reporting system; contractor involvement in testing; protection of DT&E data used for OT&E; the Single Acquisition Management Plan (SAMP); and combined DT&E/OT&E. All information was reorganized along subject matter lines. This instruction has been revised throughout.

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Chapter 1**GENERAL GUIDANCE**

1.1. The Purpose of Test and Evaluation (T&E). The primary functions of T&E are to deliver effective and suitable systems, and to identify and resolve deficiencies as early as possible. The Air Force will conduct T&E to support the acquisition, modification, upgrade, and sustainment of weapon systems and product groups. The single manager (SM) will ensure systems and product groups meet Air Force peacetime and wartime missions by:

- Providing timely, accurate, and affordable information to decision makers so they may assess whether a system or technique is useful and cost-effective to the military.
- Identifying and resolving deficiencies early.
- Supporting decision makers in assessing how to best employ limited resources.
- Reducing risks during the acquisition and sustainment phases of systems' life cycles.
- Ensuring the acquisition community delivers operationally effective and suitable systems to Air Force users.
- Ensuring systems continue to be operationally effective and suitable (sustained) throughout their life cycles.

- Giving operational users the information needed to develop tactics, doctrines, procedures, and system enhancements.

1.2. The T&E Process. The T&E process is based on the scientific method and the principle of “predict - test - compare” as shown in figure 1.1. The Air Force acquisition and test communities will apply the T&E process throughout the system acquisition cycle to identify and resolve deficiencies, and demonstrate system effectiveness and suitability. The core elements of the T&E process are described below:

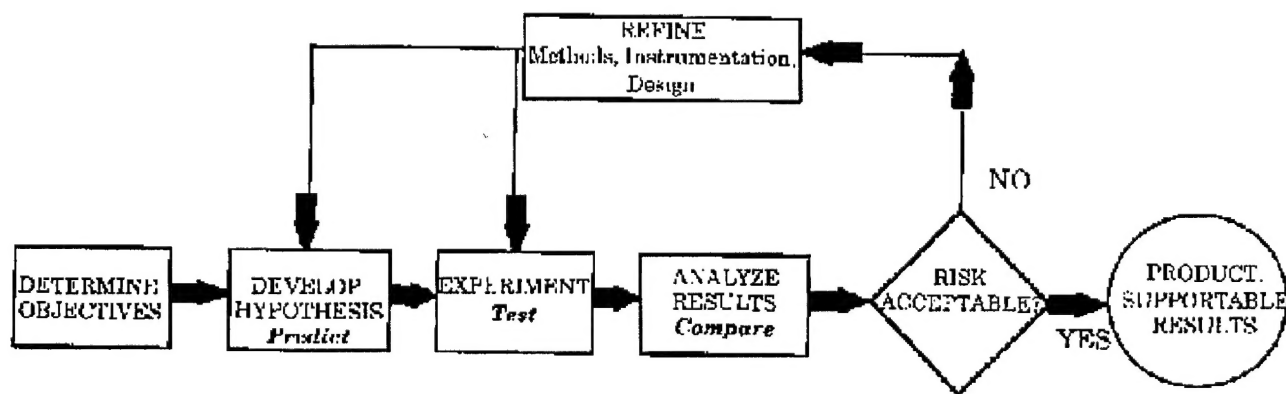
1.2.1. Scientific Method. The T&E process uses the scientific method to build experiments or tests as follows: a hypothesis is developed as a prediction of performance; the experiment or test is executed; and the data analyzed and compared to the original hypothesis or prediction. If the identified risk is acceptable, the experiment or test is complete. If the risk is not acceptable, refinements are made to one or more of the following: the system’s design; the system’s operating concept; the experiment’s design (e.g., test method, test instrumentation, or data analysis method); or the original prediction. The test is then repeated. Air Force acquisition and test personnel will use the T&E process to identify and resolve problems early, decrease acquisition program risk, and increase decision maker confidence in T&E results.

1.2.2. Predict. This part of the T&E process is supported by modeling and simulation (M&S) tools and the results of previous testing. M&S tools help develop T&E concepts and predict results prior to testing. They can predict and explore potential problems for early resolution, and reduce the amount of actual testing needed. Typically during this step, a model of the system under test interacts with environmental, threat, and other weapon system models, with various levels of fidelity, to estimate and predict system performance.

1.2.3. Test. Testing obtains or verifies data for determining the degree to which systems meet stated requirements. This part of the T&E process is supported by test facilities and range instrumentation. These devices are used to produce and record data from testing.

1.2.4. Compare. This part of the T&E process compares measured test data to predicted results, followed by evaluation of the differences found. As these differences are reduced, confidence is gained about the design and performance of the system under test. This part of the T&E process is supported by requirements documents, test plans, test results, analytical and statistical tools, evaluations, and summaries from current and previous test projects. Test reports will be concise, timely, and contain critical information needed by decision makers.

Figure 1.1. The Scientific Method.



NOTE: Early problem identification and resolution must take place at all stages of development.

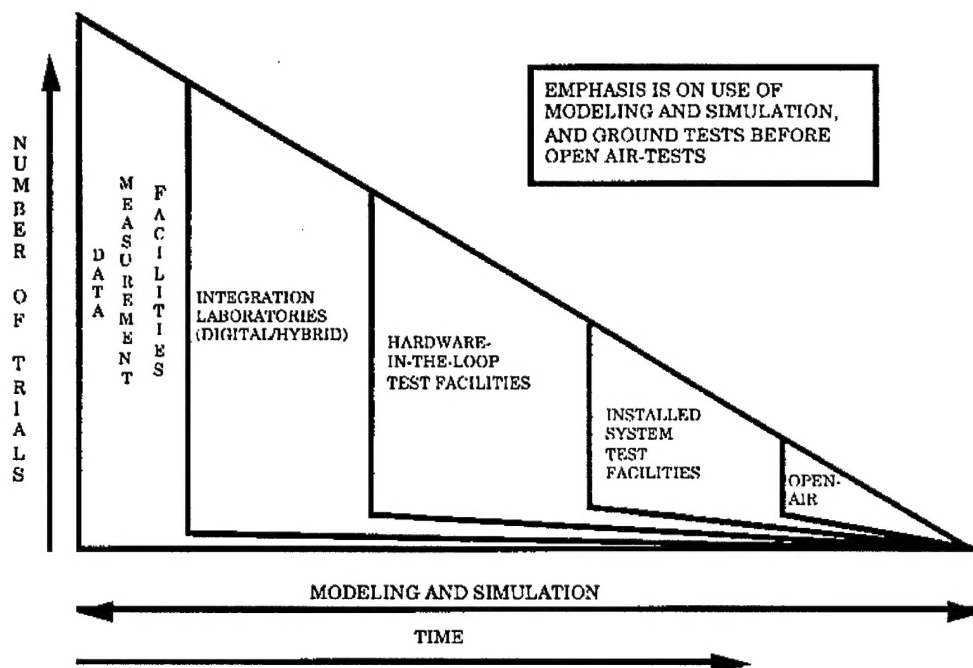
1.3. Test Capabilities and Facilities. The capabilities, facilities, and instrumentation used in the T&E process are shown in figure 1.2. The system design begins with computer models and simulations capable of numerous low cost replications, progresses through integrated facilities of higher cost and complexity, but with fewer replications, and finishes with highly selective testing in realistic, open-air environments. Each step predicts results for the next step in the system design, and reduces unnecessary and increasingly costly tests later in the program.

1.3.1. Modeling and Simulation (M&S). The T&E process uses computer-aided simulations and analysis prior to testing to help design tests and predict test results, and after testing to extrapolate test results to other conditions. M&S will be used to provide constant feedback for system development and improvements. Use of M&S should begin during the Concept Exploration Phase of the Acquisition Process and continue throughout the system’s life-cycle. Use of M&S should be consistent with Air Force approved infrastructure initiatives and system architectures such as J-MASS, JSIMS, and JWARS.

1.3.2. Data Measurement Facility. Measurement facilities quantify the capabilities and limitations of systems, subsystems, and technologies. They provide needed inputs to computer simulations, explore and evaluate advanced technologies, confirm design capabilities, identify design problems, and determine employment options.

1.3.3. System Integration Laboratory (SIL). SILs are facilities designed to test the interoperability and compatibility of components, subsystems, and systems when they are integrated with other systems or functions. They are used to evaluate individual hardware and software interactions and, at times, involve the entire weapon system. A variety of computer simulations and test equipment are used to generate scenarios and environments to test for functional performance, reliability, and safety.

Figure 1.2. Test and Evaluation Facilities and Capabilities Hierarchy.



1.3.4. Hardware-in-the-Loop (HITL). HITL facilities include specialized indoor facilities providing a secure environment to test techniques and hardware against simulations of hostile weapon system hardware or actual hostile weapon system hardware. They are used to determine threat system susceptibility and effectiveness, and to evaluate the performance of systems and techniques. HITL is the first opportunity to test uninstalled system components in a realistic simulated environment.

1.3.5. Installed System Test Facility (ISTF). ISTFs provide a secure capability to evaluate systems installed on, or integrated with, host platforms. The system under test is stimulated by threat signal generators and its responses evaluated to provide critical, integrated system performance information. Their primary purpose is to evaluate integrated systems in installed configurations to test specific functions of complete, full-scale weapon systems.

1.3.6. Open-Air Range (OAR). OARs are used to evaluate systems in realistic backgrounds, clutter, noise, and dynamic environments. These resources are typically divided into subcategories of test ranges and airborne testbeds. The primary purpose of open-air testing is to evaluate systems in real-world, representative environments and operating conditions. Open-air testing validates system performance and effectiveness to a high confidence level. If properly structured, open-air testing can be used to validate and calibrate ground test facilities and models.

1.4. Types of T&E. There are two major types of T&E in the defense system acquisition process: developmental test and evaluation (DT&E); and operational test and evaluation (OT&E). Government agencies and contractors may conduct DT&E. DT&E and OT&E will be combined when appropriate; however, a dedicated phase of OT&E is normally required. OT&E is described in AFI 99-102.

Chapter 2

DEVELOPMENTAL TEST AND EVALUATION

Section A—General Information

2.1. Purpose of Developmental Test and Evaluation (DT&E). Various kinds of DT&E are conducted throughout a system's life cycle to ensure the Air Force acquires and maintains operationally effective and suitable systems which meet users' needs. Both contractor and government personnel conduct DT&E to identify and resolve deficiencies as early as possible. Decision makers use DT&E results to verify the extent to which design risks have been minimized, verify contract performance, determine system safety, assess military utility and system reliability, and determine system readiness for dedicated OT&E. On fielded systems, DT&E is used to extend the useful military life of systems, increase current performance capabilities, analyze materiel deficiencies, and implement solutions. The early identification and resolution of deficiencies prevents problems from continuing through the balance of testing and into the field.

2.2. Scope of Developmental Test and Evaluation (DT&E). This AFI uses the general term "DT&E" to cover a broad range of T&E activities conducted during all phases of a system's life cycle. DT&E supports virtually every new or fielded system and/or component at various points in its life cycle. The single manager (SM) or item manager proposes the type of funding required for each development program depending on the nature and objectives of the work required. The test process guidance in this AFI will be used to conduct DT&E during each phase of a system's life cycle, as appropriate.

2.2.1. Developmental Test and Evaluation (DT&E) During Acquisition. DT&E conducted during acquisition provides complete and reliable data for estimating the military utility of new systems or items, and forms the basis for making decisions to continue the acquisition process. In some instances, DT&E may continue past Milestone III for highly concurrent programs where development and production overlap. DT&E is conducted on new systems, or on product improvements to fielded systems, to expand their current performance envelopes or capabilities. In addition, DT&E during acquisition:

- Evaluates design approaches, validates analytical models, quantifies contract technical performance and manufacturing quality, measures progress in system engineering design and development, minimizes design risks, and predicts integrated system performance (effectiveness and suitability) in operationally relevant environments.
- Identifies, tracks, and resolves design deficiencies as early as possible. Also identifies enhancements.
- Provides data for cost-performance trade decisions before system downselect, and during system development.
- Is funded with research, development, test and evaluation (RDT&E) (3600) funds.
- Supports the acquisition of new or improved materiel or operational capabilities before acceptance for operational use or production.
- Supports the decision to certify the system ready for dedicated Initial Operational Test and Evaluation (IOT&E).

2.2.2. Developmental Test and Evaluation (DT&E) During Sustainment. DT&E is conducted to support the sustainment portion (generally after Milestone III) of a system's life cycle. This DT&E includes all T&E activities needed to keep systems current or extend their useful life after production and fielding. DT&E for sustainment may also include efforts to expand or upgrade the current performance envelopes and capabilities of systems. DT&E for sustainment will follow the test process guidance in this AFI. In addition, DT&E during sustainment:

- Is planned, conducted, and reported for improvements, modifications, or upgrades to fielded systems which:
- Extend their useful military life within the current performance envelope or capabilities. In these cases, use Procurement (e.g., 3010, 3020, 3080) funds for systems still in production, or O&M (3400) funds for systems no longer in production but still in the operational inventory.
- Expand or increase the current performance envelopes or capabilities. In these cases, use RDT&E (3600) funds.
- Identifies, tracks, and resolves system deficiencies as early as possible. Identifies enhancements. Also identifies quality, reliability, maintainability, and safety problems and solutions.
- Ensures fielded systems continue to perform as required.
- Provides information which may lead to future modification or upgrade programs.
- Supports modification or upgrade programs for fielded systems when a sufficient amount of integration testing is needed.

- Provides aging and surveillance testing.
- Verifies changes in operational environments.

2.2.3. **Qualification Test and Evaluation (QT&E).** QT&E is a modified form of DT&E conducted on commercial off-the-shelf (COTS), nondevelopmental items (NDI), and government furnished equipment (GFE). Candidate systems for QT&E require little or no government funded research and development (R&D), engineering, design, or integration efforts. In addition, QT&E:

- Is planned, conducted, and reported following the same test process guidance in this AFI applicable to all DT&E.
- Identifies, tracks, and resolves system deficiencies as early as possible. Also identifies enhancements.
- Supports the verification of changes, modifications, or upgrades to fielded systems.
- Is funded with Operations and Maintenance (O&M) (3400) funds, or Procurement (e.g., 3010, 3020, 3080) funds.
- Supports the decision to certify the system ready for dedicated Qualification Operational Test and Evaluation (QOT&E).

2.2.4. **Compatibility, Interoperability, and Integration Testing.** A type of qualification test and evaluation (QT&E) that ensures users' compatibility, interoperability, and integration requirements are evaluated in operationally relevant environments. It demonstrates correct system interaction and responsiveness, and may continue throughout the system's life cycle. For compatibility, interoperability, and integration testing pertaining to network software and hardware components, see AFI 33-108, *Compatibility, Interoperability, and Integration of Command, Control, Communications, Computer (C4) Systems*.

2.2.5. **Contractor DT&E.** Contractors will conduct DT&E in the acquisition strategy. Similar to government conducted DT&E, contractor DT&E and QT&E identify, track, and resolve system deficiencies as early as possible. The SM will oversee all contractor conducted T&E, and retain final approval authority over all contractor test plans.

2.2.5.1. **Government Oversight.** The greater the reliance on contractors for testing, the greater the need for oversight by knowledgeable government officials. The obligation of government funds, the final evaluation of results, and the approval of test reports will remain government responsibilities. See OMB Policy Letter 92-1, *Inherently Governmental Functions*, for guidance about which functions must be retained by the government.

2.2.5.2. **Contractor Responsibilities.** Contractor DT&E responsibilities must be clearly defined in the request for proposal (RFP) and the test and evaluation master plan (TEMP), to include the requirements for independent and joint analysis and reporting with the contractor. An approved deficiency reporting (DR) system compatible with the government's DR system must be used (see paragraph 2.18). The SM, with the support of the RTO, will approve all contractor test plans and reports, and will oversee contractor testing. Contractors will not be designated as the responsible test organization (RTO), but test and evaluation tasks may be delegated to them.

2.2.6. **Live Fire Test and Evaluation (LFT&E).** LFT&E provides an assessment of the vulnerability (or lethality) of a weapon system as it progresses through its development and prior to the full-rate production decision (Milestone III). If the system under development is a covered system for LFT&E purposes, the SM will ensure LFT&E is funded and the test plan approved before the MS II decision. LFT&E must be completed before the Milestone III decision. See AFI 99-105, *Live Fire Test and Evaluation*, and DoD 5000.2-R, Appendix IV.

2.2.7. **Production Acceptance Test (PAT).** The SM or contractor, as appropriate, will ensure DT&E is conducted on production items to demonstrate that specifications and performance-based requirements of the procuring contracts or agreements have been fulfilled. The government will oversee any contractor conducted PATs. The following types of PAT are further defined in Appendix III:

- First article test (FAT).
- Lot acceptance test (LAT).
- Preproduction qualification test (PPQT). SMs must report PPQT results to decision makers prior to the applicable production decision.
- Production qualification test (PQT). SMs must report PQT results to decision makers prior to the full-rate production decision.

2.2.8. **Combined Test and Evaluation (T&E).** SMs will structure T&E programs to integrate all developmental, operational, live fire test, and modeling and simulation (M&S) activities conducted by different agencies into an efficient continuum. SMs and testers will use a combined test approach when there are test efficiencies, and cost and schedule savings. For example, DT&E and OT&E may be combined when the data, test scenarios, measures of effectiveness, resources, and objectives of both tests are similar and compatible. The SM and RTO may form teaming arrangements with the contractor if that is an effective way to reduce total cost and duplications in data and resources. However, a combined T&E approach must not compromise either developmental or operational test objectives. See paragraph 6.10 for more details.

2.3. Examples of Programs and Activities Covered by This Instruction.

- PMD-directed programs in acquisition categories (ACAT) I through III.
- Modifications and upgrades.

- COTS, NDI, and GFE systems.
- Automated information systems (AIS), automated data processing (ADP) systems, and network software and hardware components.
- Programs that develop or procure one or only a few units over an extended period such as a satellite system.
- Prototype systems.
- Aircraft/stores certification (SEEK EAGLE) (AFI 63-104).
- Programs directed by higher authority such as the Secretary of the Air Force (SAF) or Chief of Staff of the Air Force (CSAF).
- Systems developed using evolutionary or incremental acquisition strategies.
- Systems produced for foreign military sales.
- Advanced concept technology demonstrations (ACTD).
- Technology demonstrations not covered by AFD 61-1.
- Preplanned product improvements (P3I).
- Hardware and software integration.
- Production acceptance test (PAT).
- Live fire test and evaluation (LFT&E) programs.
- Logistics test and evaluation.

2.4. Examples of Programs and Activities Not Covered by This Instruction.

- Nuclear components governed by joint DoD-Department of Energy agreements.
- Threat simulators evaluated under the DoD threat simulator program and Air Force simulator validation process.
- Training systems that are totally contractor provided, maintained, and operated.
- Science and technology (S&T) programs falling under the guidance of AFD 61-1 and accompanying AFIs.
- Industrial maintenance inspections (IMI).
- OT&E programs covered by AFI 99-102.

2.5. Funding for DT&E. Explicit guidance on when to use RDT&E, O&M, or Procurement funding for DT&E is contained in DoD 7000.14-R, Vol 2A, *Financial Management Regulation*, Chapter 1. The term "RDT&E" generally refers to the type of funding appropriation (3600) intended for research, development, test and evaluation efforts. A key decision criteria is whether or not the proposed DT&E supports a program that expands the current performance envelope or capabilities of the system. When there is doubt as to the proper assignment of T&E costs between appropriations, seek additional guidance through financial management channels, or through HQ USAF/TER and SAF/AQXR. Also see AFI 65-601, Volume 1, *Budget Guidance and Procedures*.

2.6. Requests to Modify Requirements for DT&E. HQ USAF/TE is the sole waiver authority for this instruction. Requests for waiver must be submitted with rationale and user, developer, and tester concurrence in writing through AFMC/DO to HQ USAF/TE. The SM will document any approved waivers to DT&E procedures or requirements in the TEMP, and the program element monitor (PEM) will document waivers in the PMD.

Section B—Other Types of T&E

2.7. Operational Test and Evaluation (OT&E). OT&E is conducted in an environment as realistic as possible to determine the system's operational effectiveness and operational suitability, and to ensure operational requirements are met. Initial OT&E (IOT&E) supports the full-rate production or fielding decision, and follow-on OT&E (FOT&E) is conducted during production and deployment of the system. For more information about OT&E, see AFI 99-102, *Operational Test and Evaluation*.

2.8. Multiservice T&E. Multiservice T&E is conducted on acquisition or sustainment items by two or more Services and jointly implemented. The designated lead Service has the overall responsibility for management of the multiservice program and will ensure supporting Service requirements are included. This guidance also applies to testing with other DoD or Federal agencies. Multiservice T&E will be documented in the PMD and the TEMP.

2.8.1. Lead Service. When the Air Force is designated the lead Service for multiservice T&E the SM will manage the program and include the supporting Service's requirements. The RTO will plan, conduct, and report the DT&E according to this instruction; prepare and coordinate a single DT&E plan and a final report summarizing the conclusions and recommendations of each Services' reports; and explain any significant differences between the Services' reports. The SM will harmonize the DT&E requirements and methods of other Services through MOUs, MOAs, or waivers as required to eliminate conflicts or

duplication in testing. When the Air Force is not the lead Service, the SM will defer to the other Service's test instructions, or as agreed.

2.8.2. Unique Service Requirements. If a supporting Service has unique DT&E objectives or operational requirements, that Service will plan, fund, conduct, and report testing for those unique areas following their own Service instructions, or as agreed. All supporting Service testing must be documented in the TEMP.

2.9. Joint Test and Evaluation (JT&E). JT&E is non-acquisition testing and is sponsored by the Office of the Secretary of Defense (OSD). In JT&E, two or more Services cooperate to provide legacy products and data of interest to operational commanders. See AFI 99-106, *Joint Test and Evaluation*, for further guidance.

2.10. Foreign Comparative Testing (FCT). FCT is a DoD test and evaluation program prescribed by Title 10 Section 2350a(g) and centrally managed by OSD/DTSE&E. FCT provides funding for U.S. test and evaluation of selected equipment items and technologies developed by allied countries when these systems are identified as having good potential to satisfy valid DoD requirements (see AFI 61-302, *Comparative Research and Development Agreements*).

2.11. Advanced Concept Technology Demonstrations (ACTD). ACTDs are a means of demonstrating the use of mature technologies to meet potential military needs. They provide a mechanism for rapid transition of emerging technologies to operational users. ACTDs are not a formal part of the acquisition process or formal test efforts, but "demonstrations" under the direction of an ACTD sponsor. The demonstration is jointly sponsored. The SM, RTO, and OTA will participate as required by the ACTD sponsor, Headquarters Air Force, and Deputy Under Secretary of Defense for Advanced Technology (DUSD/AT).

Section C—Testing of Commercial and Nondevelopmental Items

2.12. Commercial-off-the-Shelf (COTS) Items. COTS items include already developed materiel, systems, subsystems, software, and hardware. SMs will manage DT&E (normally QT&E) on COTS items to demonstrate the item, modified or as is, integrates with other systems, satisfies the mission need, and meets operational requirements. The SM will ensure the test community, including the OTA, is involved in the COTS acquisition process from the start. The SM will write requests for proposal (RFP) in terms that enable and encourage offerors to supply commercial items to meet user requirements. The test approach will be tailored to the type of system, its intended operational use, and the amount of test data already available. Sources of this data include:

- Contractor test results.
- Usage data from other military and/or commercial customers.
- Results from independent test organizations.

2.13. Nondevelopmental Items (NDI). NDIs are essentially the same as COTS items. The procedures used to test NDIs are the same as for COTS programs.

Section D—General DT&E Guidance.

2.14. Starting Early. DT&E and OT&E personnel will be involved as early as possible in the system acquisition, and the problem identification and resolution processes. The Single-Face-to-Customer (SFTC) offices will be involved in early test planning since they are fundamental to the success of the overall T&E effort. For new programs, the SPO (or other acquisition agency if a SPO does not exist) will contact an SFTC office for test planning assistance.

2.15. The Single-Face-to-Customer (SFTC) Office. From a new program's inception, the SFTC office will serve as consultants for developing a complete understanding of system test requirements. They will participate in the Air Force test process, help develop test documentation, and provide T&E options and associated risks to the RTO, SPO, and OTA. After AFMC designates or approves an RTO for the new program, the RTO becomes the single T&E point of contact for the new program. The RTO will work with the SPO (or other acquisition agency) to maintain a "single face" to those outside the DT&E community.

2.16. Assessing the Design. An integrated product team (IPT) composed of design, system, test, manufacturing, logistics, and user personnel will define test objectives, methodologies, and evaluation criteria during the initial phase of the program (Phase 0). These elements are combined to form the overall T&E strategy for the acquisition and sustainment phases, and guide the detailed T&E planning, preparation, and execution required throughout the system life cycle. Team members will

assess design deficiencies using technical performance measurement techniques from the System Engineering and Configuration Management Processes.

2.17. Resource Planning. DT&E and OT&E personnel will together determine the required numbers of test articles and special instrumentation or data requirements; simulators or surrogates of threat weapons or devices; and other test resources. The SFTCs will ensure customers are made aware of all applicable test resources in time to include the use of those resources in their test plan. AFI 99-109, *Test Resource Planning*, explains the test resource planning process.

2.18. Establishing a Deficiency Reporting (DR) System. At the beginning of each acquisition program, the SM will establish a DR system. TO 00-35D-54, *USAF Deficiency Reporting and Investigation System*, describes procedures for identifying, reporting, tracking, and resolving system deficiencies identified during T&E. During DT&E execution, the contractor and RTO will identify and document all deficiencies as early as possible, and recommend corrective actions according to the procedures established for that program.

2.18.1. Use of Contractor-Based Deficiency Report System. The SM must include in the RFP the requirement for the contractor to establish a DR system for contractor conducted tests. The contractor's system must be compatible with, and provide complete and useable results to, the government's DR process. The prime contractor will be required to enforce these DR requirements for its subcontractors and suppliers. The government will have access to the contractor's DR system and be able to transfer relevant information to the government DR process.

2.18.2. Setting Priorities. The RTO, OTA, SM, and users will prioritize all open DRs for any Air Force programs involving DT&E and OT&E. If the SM cannot correct or resolve known DRs before dedicated OT&E begins, or defers fixes for any DRs past OT&E, the OTA and users will prioritize and the SM will analyze the operational impacts of those deficiencies and limitations. The SM and OTA will reach agreement during the certification process for dedicated IOT&E, and develop a plan for resolving and retesting deficiencies found in operational testing.

2.18.3. Waivers. A waiver must be attained from AFMC/ENPP if the government and/or contractor uses a DR system different than that described in TO 00-35D-54.

2.19. Operationally Relevant Testing. IPT personnel must plan to conduct government DT&E in as operationally relevant an environment as possible without compromising the goals of DT&E. This focus on test realism in both planning and execution is important for identifying and resolving deficiencies earlier. Once a system has reached OT&E, deficiencies are more difficult and costly to resolve. Developmental testers will evaluate the system against user requirements (as stated in the ORD) as well as the system specifications. Operational suitability will be given equal consideration with operational effectiveness. Operationally relevant testing will be described in the TEMP and in detailed test plans (see AFPAM 99-116, *Test and Evaluation Management Guide*).

2.20. Using Event-Driven Schedules and Exit Criteria. DoDD 5000.1 emphasizes the importance of event-driven schedules (vice calendar-driven) and exit criteria throughout the acquisition process. The SM will ensure the planned DT&E is sufficient to verify a program meets the test objectives and exit criteria for each acquisition phase. The SM and RTO must ensure adequate time is scheduled between DT&E events, and before commencement of dedicated OT&E. The SM and RTO will not consider any acquisition phase complete unless all significant test events and exit criteria are successfully completed, and all significant deficiencies have been resolved before certification of readiness for dedicated OT&E.

2.21. Ensuring Environmental Compliance and Pollution Prevention During T&E. SMs and RTOs must comply with all Federal, state, and local environmental standards. The SM must ensure the Environmental Impact Analysis Process, to include Environmental Assessments and Federal Consistency Determinations, are integrated into the DT&E planning process. The SM will evaluate occupational health and hazardous waste issues during DT&E to minimize adverse effects on supportability.

2.22. Disclosing Test Data to Foreign Nationals. The test community must use AFI 16-201, *Disclosure of Military Information to Foreign Governments and International Organizations*, to determine when to disclose test data or materials to foreign nationals. AFI 16-201 also governs the disclosure of foreign nationals' access to Air Force equipment, facilities, and aircraft.

2.23. Use of Government Test Facilities. The SFTC offices and test centers will provide all potential users with information and assistance on using the Major Range and Test Facility Base (MRTFB) and other government test facilities. The SFTCs will help develop test support requirements for users upon request. Use of the MRTFB is described in DoDD 3200.11, *The Major Range and Test Facility Base*.

2.23.1. Air Force Use of Test Facilities. SMs and test planners will plan to use Air Force test facilities first, followed by DoD (MRTFB) facilities, to the maximum extent possible within acquisition program cost and schedule constraints. Contractor-owned facilities may be considered when DoD facilities are not available, or if contractor facilities provide a ready capability not available in government facilities. If the test concept calls for testing at contractor or non-MRTFB facilities, the SM must include these requirements in the request for proposal (RFP), and explain in the TEMP why these facilities are required.

2.23.2. Waivers. If use of non-MRTFB or contractor facilities is planned for any program, the SM must justify that use with a cost-benefit analysis, and request a waiver from AFMC/DO. The waiver must be approved and documented in the TEMP before SMs obligate the government to using non-MRTFB or contractor facilities. Provide an information copy of the waiver to HQ USAF/TE.

2.23.3. Scheduling Test Resources. SMs, RTOs, and OTAs will use the Air Force Priority and Precedence Rating System described in AFI 16-301, *US Air Force Priority System for Resources Management*, as a guide for scheduling MRTFB resources.

Section E—DT&E Objectives

2.24. DT&E Focus on the System. SMs, contractors, and RTOs, as appropriate, will plan for, structure, and conduct DT&E programs to provide clear assessments of system performance appropriate to each phase and milestone. Address the following areas:

2.24.1. General Objectives of DT&E.

- Identify potential operational and technological capabilities and limitations of the selected alternative system or concept identified in the Analysis of Alternatives (AoA).
- Support the early identification of cost-performance trade-offs by providing analyses.
- Support the identification and description of design technical risks.
- Identify, evaluate, and resolve system deficiencies and enhancements as early as possible using operationally relevant T&E.
- Assess progress toward meeting critical operational issues, mitigation of acquisition technical risk, achievement of manufacturing process requirements, and system maturity.
- Assess validity of assumptions and conclusions from the AoA.
- Provide data and analysis in support of the decision to certify the system ready for dedicated operational test and evaluation.
- Assess progress toward meeting information system security requirements, to include minimum requirements in DoD Directive 5200.28, *Security Requirements for Automated Information Systems*.

2.24.2. System Performance.

- Evaluate system compliance with specifications in relation to operational requirements, life cycle costs, and schedules.
- Identify, evaluate, and resolve system deficiencies and enhancements according to TO 00-35D-54, *USAF Deficiency Reporting and Investigation System*.
- Perform cost-schedule-performance trade-offs.
- Evaluate system capability operate in a nuclear, biological and chemical (NBC) environment.
- Evaluate system vulnerability or lethality during LFT&E.
- Evaluate system performance envelopes and limitations, projected effectiveness, and safe operating parameters under operationally relevant conditions, to include survivability.

2.24.3. System Compatibility and Interoperability.

- Evaluate system compatibility and interoperability with existing and planned equipment or systems using logistics test and evaluation procedures, and the integrated logistics support (ILS) elements as a framework for evaluation.
- Evaluate network hardware and software system effectiveness, suitability, interoperability, compatibility, and integration.
- Track and evaluate system configuration changes.

2.24.4. System Suitability.

- Evaluate system reliability, maintainability, and availability.
- Identify, evaluate, and resolve deficiencies in fielded systems' reliability and maintainability.
- Conduct aging and surveillance programs.
- Assess system supportability and identify life cycle cost drivers.

2.24.5. System Safety.

- Identify, evaluate, track, and resolve all safety deficiencies before start of dedicated OT&E.
- Ensure the system is safe to operate, or residual hazards have been mitigated to acceptable levels of risk.

2.24.6. Soundness of System Design.

- Ensure engineering and systems integration is complete.
- Identify all significant design problems, necessary changes, and retesting to verify resolutions to deficiencies.
- Perform validation of models and simulations of system performance with actual test data.
- Determine the technical risk of the design and ways to mitigate these risks.
- Evaluate the system's integrated diagnostics.
- Determine human engineering aspects of the system and limiting factors.

2.24.7. System Training Requirements.

- Identify and develop training programs and technical materials to support the system.
- Develop and procure training systems (e.g., simulators and trainers) to emulate the characteristics of the system.

2.25. Certification of System Readiness for Dedicated OT&E. DoD 5000.2-R requires a certifying official from the developing agency to formally certify systems are ready to enter the dedicated phase of OT&E. The Program Executive Officer (PEO), Designated Acquisition Commander (DAC), or equivalent official (the "certifying official") will determine the broad scope and certification requirements for certifying system readiness to begin OT&E. The SM is responsible for implementing an effective system certification process as early as practical in new development programs. Use of the certification process is mandatory for reviewing all ACAT programs. See AFMAN 63-119, *Certification of System Readiness for Dedicated Operational Test and Evaluation*, for details.

Chapter 3

MANAGEMENT RESPONSIBILITIES

3.1. Office of the Under Secretary of Defense for Acquisition and Technology, Director, Test, Systems Engineering and Evaluation (OSD/DTSE&E). DTSE&E:

- Exercises oversight responsibility for major defense acquisition programs, or any program in which the Secretary of Defense or Congress has special interest or oversight.
- Formulates overarching DT&E policy and procedures for DoD.
- Advises the Secretary of Defense and the Under Secretary of Defense for Acquisition and Technology (USD(A&T)) on DT&E matters.
- Publishes once a year, with the Director, Operational Test and Evaluation (DOT&E), a combined list of OSD T&E oversight programs.
- In conjunction with DOT&E, approves the TEMP for OSD T&E oversight programs.
- Participates in integrated product teams (IPT) as required for program planning and execution.

3.2. Director, Operational Test and Evaluation (OSD/DOT&E). DOT&E:

- Exercises oversight responsibility for major defense acquisition programs, or any program in which the Secretary of Defense or Congress has special interest or oversight.
- Prescribes overarching OT&E and live fire test and evaluation (LFT&E) policies and procedures for DoD.
- Monitors and reviews all LFT&E and OT&E in the DoD.
- Prepares an annual report for the Secretary of Defense and Congress summarizing the OT&E activities of the DoD during the fiscal year.
- Publishes once a year, in conjunction with the DTSE&E, a combined list of OSD T&E oversight programs.
- In conjunction with DTSE&E, approves the TEMP for OSD oversight programs.
- Approves OT&E plans for oversight programs.
- Participates in integrated product teams (IPT) as required for program planning and test execution.

3.3. Chief of Staff of the Air Force (CSAF). CSAF:

- Ensures resources are available to organize, train, and equip personnel for T&E throughout the Air Force.

3.4. Headquarters, US Air Force Director, Test and Evaluation (HQ USAF/TE). HQ USAF/TE will:

- Set Air Force T&E policy, and oversee the T&E process throughout the Air Force.

- Advocate funding for T&E resources, and ensure the T&E infrastructure is properly configured for future systems testing.
- Review all Mission Need Statements (MNS), Program Management Directives (PMD), Analyses of Alternatives (AoA), Operational Requirements Documents (ORD), and other T&E-related documents for use by the Air Staff, field agencies, and OSD.
- Approve and sign TEMPs before Air Force Acquisition Executive (AFAE) approval.
- Approve all requests to modify the requirements for DT&E.
- Participate in integrated product teams (IPT) as required for program planning and execution.
- Keep the CSAF and the Secretary of the Air Force (SAF) informed on the status of all Air Force T&E.

3.5. Assistant Secretary of the Air Force for Acquisition (SAF/AQ). SAF/AQ will:

- Oversee DT&E on all acquisition programs.
- Document T&E responsibilities in the PMD.
- Assign a program element monitor (PEM) for each acquisition or sustainment program.
- Assign staff to participate on integrated product teams (IPT) as required for program planning and execution.

3.6. Headquarters, Air Force Materiel Command (HQ AFMC). AFMC will:

- Manage the Air Force DT&E process.
- Assist operating commands in ORD preparation (see paragraph 5.4).

3.7. Headquarters, AFMC Director of Operations (HQ AFMC/DO). AFMC/DO will:

- Serve as the Air Force focal point for the conduct of all Air Force DT&E and LFT&E.
- Establish and provide for DT&E training, organization, and resources.
- Designate the RTO for DT&E if the SM has not selected an RTO. Approve the RTO selected by the SM, if appropriate.
- Assist the operating commands in ORD preparation, and provide inputs on measures of effectiveness (MOE) to include in RCMs.
- Ensure each AFMC center establishes a center test authority (CTA) to oversee the DT&E process.
- Function as the certifying authority for T&E Acquisition Professional Development Program.

3.8. AFMC Single Manager (SM). With respect to T&E, the SM will:

- Provide cost and technical data to operating commands for inclusion in the Analysis of Alternatives (AoA).
- Request test support and resources sufficiently early to allow for proper planning.
- Contact the appropriate SFTC office for test planning consultation for all new programs without a PMD-designated RTO (and prior to any test planning).
- Choose the most appropriate RTO from SFTC-supplied list of candidates, and forward the candidate RTO to AFMC/DO for approval.
- Form integrated product teams (IPT) as required for program planning and execution.
- Ensure all DT&E is conducted according to approved test plans.
- Prepare the TEMP.
- Chair the Test Planning Working Group (TPWG).
- Make acquisition documentation available to DT&E testers, SFTC offices, and users.
- Use the ORD, MNS, and threat assessment documents to translate system requirements into performance-based specifications and standards during each acquisition phase.
- Ensure the appropriate AFMC test center or RTO is cognizant of each DT&E project or acquisition program.
- Develop and maintain an integrated test and evaluation program (ITEP) to provide overall system life cycle test planning and documentation for fielded systems.
- Form and chair IPTs (such as the Material Improvement Program Review Board (MIPRB) and the Joint Reliability and Maintainability Evaluation Team (JRMET)) to track and resolve deficiencies.
- Ensure knowledgeable and objective testers (preferably SFTC or RTO representatives) are members of the RFP, source selection, and integrated product teams.
- Ensure government access to contractor T&E data, deficiency reporting processes, and test results through the contract proposal process.
- Certify systems are ready for dedicated OT&E according to AFMAN 63-119.

3.9. AFMC Single-Face-to-Customer (SFTC) Offices. The SFTC offices will:

- Facilitate initial OT&E planning for new programs, major modifications, upgrades, or product improvement programs.

- Facilitate OT&E investment planning activities through the Technical Planning Integrated Planning Teams (TPIPT).
- Serve as test consultants able to identify available resources and risks in test options (see AFI 99-109, *Test Resource Planning*).
- Help manage test planning and develop test documents prior to designation of RTO.
- Provide a prioritized list of recommended RTOs to the SM if the PMD has not previously designated the RTO.
- Transfer DT&E planning responsibility to the RTO, once assigned.
- Document and implement Air Force T&E processes.

3.10. AFMC Air Logistics Centers (ALC) and Product Centers. Each center commander will:

- Designate a Test Representative as the single focal point for T&E.
- Establish procedures for implementing the T&E process consistent with this AFI.
- Develop policy and procedures for conducting thorough technical and safety reviews for resident T&E programs.
- Provide T&E support to SMs, RTOs, AFOTEC, and operating commands as required in each ITEP, PMD, and TEMP.
- Ensure all necessary DT&E is conducted in support of fielded systems during their life cycles.
- Participate in integrated product teams (IPT) as required for program planning and execution.

3.11. Test Centers. The Air Force Flight Test Center (AFFTC), Air Force Development Test Center (AFDTC), and Arnold Engineering Development Center (AEDC) will:

- Conduct DT&E using the T&E process and according to this AFI.
- Conduct long range planning to ensure adequate T&E infrastructure and processes are in place to support future technologies and acquisition programs.
- Establish policy and procedures for conducting thorough technical and safety reviews for all T&E conducted at the center.
- Participate in initial T&E planning for new programs, major modifications, upgrades, and product improvement programs.
- Participate in all T&E resource investment planning processes, groups, boards, etc.
- Provide support to the SFTCs and SMs on existing and planned test capabilities.
- If designated the RTO or PTO, provide T&E support to SMs and AFOTEC as required in the PMD, TEMP, and paragraph 3.12.
- Participate in test planning working groups (TPWG) and integrated product teams (IPT) as required for test planning and execution.

3.12. Responsible Test Organization (RTO). The RTO will:

- Manage, plan, conduct, and report on DT&E according to the T&E process and this AFI.
- Formulate an integrated test approach and develop a test concept.
- Provide test results to the SM and other required organizations for DT&E of systems, subsystems, and components.
- Inform HQ USAF/TE within 24 hours of all significant test events for OSD oversight programs.
- Integrate government and contractor, and DT&E and OT&E requirements for combined test programs.
- Designate and define test responsibilities and oversee the activities of participating test organizations (PTO).
- Support test programs for laboratories, program offices, or other organizations requiring DT&E.
- Oversee DT&E safety. See AFI 91-202, *The US Air Force Mishap Prevention Program*, and AFI 31-702, *System Security Engineering*, on safety engineering.
- Establish procedures for analyzing hazards and risks at each level of testing so DT&E is conducted at the lowest feasible risk.
- Review draft ORDs to ensure the test community can effectively and efficiently evaluate the system against the user's requirements.
- As members of the RFP and source selection teams, evaluate the technical aspects of the RFP and proposals to ensure they contain clear test requirements. Ensure these documents reflect the agreed test concept.
- Participate in Test Planning Working Group (TPWG) and other IPT meetings as required.
- Use the approved ORD and system specifications to develop test plans covering the users' requirements and priorities.

3.13. Participating Test Organization (PTO). The PTO will:

- Assist the RTO in accomplishing DT&E as directed.
- Participate in integrated product teams (IPT) as required for program planning and execution.

3.14. Air Force Operational Test and Evaluation Center (AFOTEC). AFOTEC will:

- Initiate early participation in DT&E planning and development processes.
- Participate as early as possible in TPWGs and other IPTs in order to clarify system requirements.
- Prepare Section IV of the TEMP.
- Conduct early operational assessments (EOA) as required.
- Advise the SM and RTO about making DT&E more operationally relevant.
- Participate in the certification of system readiness for OT&E according to AFMAN 63-119.
- Participate in combined DT&E/OT&E to the maximum extent practical without compromising the independence of dedicated OT&E.

3.15. Operating Command. The operating command (also called the user or using command) will:

- Provide up-to-date operational requirements documents (ORD) and concepts of operation (CONOPS) to the developing command and/or RTO.
- Participate as early as possible in the development of the TEMP and DT&E plan where necessary.
- Develop an Analysis of Alternatives (AoA) or other similar study to assist the SM when making trade-offs between cost, schedule, and performance.
- Make command resources available to support T&E when possible without adversely impacting their mission.
- Participate in integrated product teams (IPT) as required for program planning and execution.

3.16. Test Planning Working Group (TPWG). The TPWG will:

- Support the SM in developing and maintaining the TEMP.
- Participate in setting test objectives, MOEs, and evaluation baselines.
- Define organizational responsibilities and relationships for testing.
- Help estimate T&E costs.
- Develop a realistic T&E schedule.
- Determine required test resources.
- Review and help prepare the test portions of RFPs and related contractual documents.
- Help evaluate contractor proposals.
- Help the SM set the scope and objectives of DT&E.
- Coordinate resource availability, including necessary facility upgrades and personnel requirements.
- Form subgroups such as a Computer Resources Working Group (CRWG) to address software T&E requirements.
- Participate in the test readiness review (TRR).
- Form a subgroup (e.g., the Logistics Test Working Group (LTWG)) to address logistics T&E requirements, schedule, planning, execution, and reporting. This group will also communicate to the TPWG the logistics resources needed to support ground tests, logistics tests, flight tests, and logistics T&E.

3.17. Air Force Communications Agency (AFCA). With respect to the T&E of new network hardware and software components, the AFCA will:

- Serve as the Air Force focal point for planning and conducting QT&E for these systems.
- Participate as early as possible in the development of the TEMP and DT&E plan where necessary.
- Serve as Executive Agent for the Interoperability Testing Steering Group.
- Develop and/or coordinate compatibility, interoperability, and integration policies, procedures, programs among Air Force organizations.
- Participate in integrated product teams (IPT) as required for program planning and execution.

3.18. Other Commands or Agencies. The participating and supporting commands, and the OTA participate in DT&E and supporting IPTs as specified in the PMD, the TEMP, and this instruction.

Chapter 4

DT&E IN THE ACQUISITION PROCESS

Section A—General Information

4.1. DT&E Support of the Acquisition Process. The acquisition process consists of four program milestones (MS) and four event-driven phases (see DoD 5000.2-R for details). The milestones are key points at which decision makers review a

program and authorize advancement to the next acquisition phase. Since DT&E results greatly influence these decisions, planning of the DT&E strategy must begin as early as possible to mitigate program risks. Specifically, SMs will structure DT&E to reduce program risk, assess attainment of technical performance parameters, and provide essential information to decision makers in support of the acquisition process.

4.2. Single Manager (SM) Responsibilities. SMs will identify critical system characteristics, objectives, T&E methodologies, and evaluation criteria during the initial phases of an acquisition program. These criteria will help determine the testing required for each phase of the acquisition process, and will provide the structure to guide the test program. SMs will report T&E results, including system capabilities, limitations, and their resolution, before each MS to ensure the program meets its objectives and exit criteria before starting the next phase.

Section B—DT&E During the Four Acquisition Phases

4.3. Pre-Milestone 0. The Air Force uses the Mission Area Assessment (MAA) and Mission Need Analysis (MNA) processes to identify mission needs and develop operational requirements. Using the "strategy-to-task" framework, users prepare mission need statements (MNS) if materiel solutions are warranted. Milestone (MS) 0, Approval to Conduct Concept Studies, marks the initial formal interface between the requirements generation and the acquisition management systems, and sets Phase 0 in motion.

4.4. Phase 0 (Concept Exploration).

4.4.1. Planning the Test Approach. The operating command will explore materiel alternatives. DT&E agencies will:

- Use laboratory testing, modeling, and simulations to assess the most appropriate concepts, technologies, and designs based on the deficiencies identified in the MNS, and the concepts proposed in the MS 0 acquisition decision memorandum (ADM).
- Validate test requirements, and identify and plan resources.
- Earmark realistic test environments for subsequent DT&E (e.g., ranges, targets, threat simulators, logistics test requirements) to ensure needed T&E infrastructure and resources are funded, acquired, or upgraded.
- Formulate an integrated test strategy for inclusion in the acquisition strategy.

4.4.2. Exiting Phase 0. Decision makers use T&E results from previous development efforts to support MS I, Approval to Begin a New Acquisition Program. A favorable MS I decision establishes a new acquisition program and authorizes entry into the next phase.

4.5. Phase I (Program Definition and Risk Reduction).

4.5.1. Program Initiation. During this phase the RTO will:

- Conduct DT&E on subsystems, components, prototypes, or preproduction articles to gather data to support calculating system performance, effectiveness, suitability, and supportability.
- Refine or validate, as appropriate, computer models and simulations to determine a preferred technical approach.
- Identify design risks and recommend testing to the SM to reduce those risks to acceptable levels.
- Ensure the critical system characteristics and critical technical parameters to be tested from the approved ORD have been formalized, and provide detailed information on the overall test schedule and required resources for Phase II.
- Assess the system for potential live fire test vulnerabilities and susceptibilities needing correction before or during Phase II.
- Evaluate the system against its technical performance-based requirements.

4.5.2. Early Operational Assessment (EOA). While Phase I testing is primarily DT&E, OTAs may examine the military utility of the system and the proposed technical approach using an EOA. (See AFI 99-102.)

4.5.3. Exiting Phase I. The SM will compare the DT&E results with predetermined exit criteria (see DoD 5000.2-R), and inform the decision makers responsible for MS II, Approval to Enter Engineering and Manufacturing Development.

4.6. Phase II (Engineering and Manufacturing Development).

4.6.1. Approving a System for Production. During Phase II, DT&E and OT&E will:

- Evaluate the system against contract requirements and performance-based operational requirements.
- Employ a combined DT&E/OT&E approach to the maximum extent practical in order to avoid duplication of effort.
- Identify, track, and resolve deficiencies using an approved deficiency reporting system.
- Assess manufacturing processes with respect to system tolerances, performance, and quality.
- Demonstrate designs are stable, operationally effective, logistically supportable, and capable of being produced efficiently.

- Arrange for interoperability certification of C⁴I systems.
- Determine the lethality of a munition system or the survivability of a combat system in accordance with live fire test (LFT) requirements.

4.6.2. Exiting Phase II. The SM, RTO, and the OTA will provide DT&E and OT&E results to support MS III, Production or Fielding/Deployment Approval. The production decision can be either low rate initial production (LRIP) or full rate production. Decision makers use Phase II T&E results to ensure:

- Updated configuration baselines and cost information.
- Validated system threat assessments.
- Proper execution of operational support plans to include transition from contractor to in-house support, if appropriate.
- Identification of operational and/or support problems.

4.7. Phase III (Production, Fielding/Deployment, and Operational Support).

4.7.1. Producing and Fielding the System. During production, fielding, and deployment, DT&E will help ensure the system's continued ability to perform as intended, provide feedback to update and validate system threat assessments, correct identified deficiencies, and ensure support resources are acquired.

4.7.2. Sustaining the System. The SM may continue to modify or upgrade systems during the sustainment portion of the system life cycle (generally after MS III) to extend useful military life, enhance producibility, or expand operational envelopes and capabilities. DT&E during sustainment is planned, conducted, and reported following the same test process guidance as is applicable to all DT&E. Systems may re-enter the acquisition system at a milestone (e.g., MS II) commensurate with the acquisition strategy for needed follow-on development or sustainment activities. During this period, the SM will:

- Update and validate models.
- Continually identify and correct quality, performance, reliability, maintainability, and safety deficiencies.
- Start an aging or surveillance program.
- Evaluate product improvement changes and engineering modifications.
- Conduct additional DT&E and production acceptance testing (PAT) to confirm and monitor performance and quality, and verify the correction of deficiencies.
- Undertake modification or upgrade efforts when appropriate.

4.7.3. Exiting Phase III. The SM must ensure systems are properly demilitarized and disposed of at the end of their useful life.

Chapter 5

KEY DOCUMENTS AND THEIR RELEVANCE TO THE DT&E PROCESS

5.1. Responsibilities for Documentation. The SM will ensure a direct link and consistency between program acquisition documentation and DT&E planning, conduct, and reporting. DT&E actions will directly support the verification of user requirements. Early DT&E involvement will ensure testers have a clear understanding of the users' needs and program decisions.

5.2. Mission Need Statement (MNS). MAJCOM personnel will prepare a MNS to identify and document mission deficiencies requiring materiel and/or software solutions. The MNS defines projected needs in generic operational terms without referring to a specific system, and forms the basis for the initial identification of T&E critical issues. Developmental testers must understand the needs and requirements identified in the MNS before developing the test concept. The test concept is a road map which identifies assumptions, rationale, test structure, timelines, and resources to provide efficient and effective T&E information to satisfy user needs.

5.3. Analysis of Alternatives (AoA). Formerly called the cost and operational effectiveness analysis (COEA), the AoA supports MS decision reviews by showing decision makers the advantages, disadvantages, and estimated costs of promising alternatives under consideration. This analysis is mandatory for potential ACAT I programs and other ACAT levels as directed by the service acquisition executive (SAE). The operating command will complete the AoA before MS I, and update it for other milestones as required by the Milestone Decision Authority (MDA). The AoA provides a historical record of the alternatives considered at each MS decision point. The measures of effectiveness (MOE) used in the AoA must be linked to the MOEs used in the ORD and other program documents. T&E programs validate the assumptions (such as weapon accuracy, sortie generation rate) used in AoA tradeoffs. The AoA must be reviewed early in the program to determine:

- If the MOEs are complete and testable, and support the alternative chosen.

- What test assets are needed.
- What type of long-term test planning is needed.

5.4. Operational Requirements Document (ORD). The ORD amplifies and refines the MNS. The operating command will prepare the ORD during Phase 0, Concept Exploration. Testable MOEs and measures of performance (MOP) from the AoA will be included in the ORD and TEMP. The ORD is solution oriented and will be based on the preferred solution selected during AoA accomplishment. The ORD documents how users will operate, deploy, and support a system, and provides initial guidance for all acquisition agencies. The TEMP and the system contract's performance-based requirements will be written to satisfy ORD requirements.

5.5. Requirements Correlation Matrix (RCM). The RCM is an attachment to the ORD and provides a system audit trail of the capabilities and characteristics identified in the ORD. It provides the basis for user needs and requirements in the ORD to be included in the Integrated Program Summary (IPS), TEMP, and Acquisition Program Baseline (APB), and serves as the foundation for developing the System Maturity Matrix (SMM) (see paragraph 5.13).

5.6. Test and Evaluation Master Plan (TEMP). The TEMP correlates and integrates T&E with the overall acquisition program strategy, schedule, and other program documentation, and defines the critical path for completing test and evaluation. The TEMP will place the most emphasis on the next phase of system development rather than provide a historical account of program progress. The TEMP should be updated prior to major milestones, program baseline changes, and when there have been significant changes to the program. The SM has overall responsibility for the TEMP, and the TPWG helps with writing. Fielded systems may have several active TEMPs at the same time to support multiple modification programs. Key elements of the TEMP may be included in a Single Acquisition Management Plan (SAMP) if appropriate for the acquisition program (see paragraph 6.12.3). The TEMP is no longer required once a program's development is completed and the COIs are satisfactorily resolved. (See DoD 5000.2-R, Appendix III.)

5.7. Single Acquisition Management Plan (SAMP). The SAMP is a comprehensive, integrated document which discusses all relevant aspects of a program in support of a MS decision. As a program management strategy document, it consolidates required documentation and is tailored for the specific needs of the program. The SAMP is structured to streamline the oversight and statutory requirements contained in all other management plans for all levels above the PEO or DAC.

5.7.1. Requirement for a SAMP. A SAMP is required by SAF/AQ for all ACAT I and II programs, and is optional for ACAT III programs. All program stakeholders must be included in the SAMP IPT process to assist in its preparation. Unique program needs and sound management practices may dictate additional detailed planning below the level appropriate for a SAMP (e.g., a TEMP may still be required). See SAF/AQ's *Single Acquisition Management Plan Guide* for further guidance.

5.7.2. Incorporation of the TEMP. The SM and program IPT may incorporate key elements of the TEMP (Parts II, III, IV, and V) into a SAMP if it makes good sense for managing the program, and adequately addresses the needs of the T&E community and senior decision makers. A separate TEMP may not be required if the SAMP adequately captures all T&E strategies and requirements necessary for program execution. However, the TEMP will remain the primary T&E management document if program risks are high, or senior decision makers require the document.

5.8. Integrated Test Plan (ITP). The ITP records all individual DT&E test plans for the contractors and the government. It is a detailed, working-level document that assists in identifying risk as well as duplicative or missing test activities. The SM will ensure the ITP describes the total test management effort and the most efficient use of all test resources at the subsystem and system levels.

5.9. Threat Assessments. DT&E planners will consider the exploitable features and threats identified in the System Threat Assessment Report (STAR) for ACAT I programs, or the System Threat Assessment (STA) for ACAT II and III programs, when defining a realistic test environment.

5.10. Acquisition Decision Memorandum (ADM). The ADM documents the decisions made and exit criteria established at a milestone decision reviews or in-process reviews. It specifies what must be done in the next acquisition phase. Developmental testers will be cognizant of and implement the decisions documented in the ADM.

5.11. Acquisition Program Baseline (APB). The APB documents the most important cost, schedule, and performance parameters identified in the ORD/RCM, and performance requirements for each phase of the program. DT&E personnel must be cognizant of the information documented in the APB because it acts as the "contract" between the SM and the MDA.

5.12. Program Management Directive (PMD). The PMD provides official Air Force direction for execution of approved, funded programs or activities. The PMD provides only top level, concise, and timely program specific direction, and does not authorize expenditure of funds. HQ USAF usually prepares the initial PMD upon MS 0 approval. HQ AFMC will provide HQ USAF with pertinent DT&E information for the PMD, including unique areas of risk, and responsibilities of each command or agency in the DT&E program. T&E officials are required to coordinate during the PMD review and approval cycle. (See HOI 800-2, *Preparation of Program Management Directives*.) The PMD typically:

- Assigns programmatic responsibilities to implementing organizations, MAJCOMs, field agencies, and test organizations, as applicable, to integrate their activities.
- Identifies review requirements and approval authorities.
- States unique program objectives, constraints, and thresholds.

5.13. System Maturity Matrix (SMM). The SMM links user requirements, "allocated" requirements, and system specifications to expected test results to be achieved over time. It lists critical technical and operational characteristics of a system that will be assessed at major decision or event milestones. All acquisition programs, with the exception of programs in production that have met all of their user requirements, require an SMM. The SMM is a management tool, not a requirements document. The SM develops the SMM in coordination with the user and OTA, and it is approved by the PEO or DAC. Acquisition personnel will use the SMM to:

- Predict system performance against analytically derived interim requirements, APB exit criteria, or other event milestones.
- Track and report actual progress toward verification of mature system performance.

5.14. Integrated Program Summary (IPS). Decision makers use the IPS with its annexes as the basis for decisions at major milestones. The SM will develop the IPS to:

- Summarize a program's structure, status, assessments and plans, as well as recommendations by the SM, PEO or DAC.
- Identify program risk areas and plans for reducing risks.
- Provide a basis for establishing program cost, schedule, and performance objectives and thresholds in the APB.
- Provide a basis for establishing exit criteria for the next acquisition phase.

5.15. System Engineering Management Plan (SEMP). The SEMP is a concise, top-level management plan describing the integration of all system design and engineering activities. The SM ensures the technical parameters in the SEMP are linked to those in the TEMP or SAMP. The SM uses the SEMP to describe:

- Requirements analysis.
- Functional analysis and allocation.
- The system configuration management process and the control of program baselines.
- Systems analysis and control.
- The system design evolution process.
- Transitioning critical technologies.

5.16. Request for Proposal (RFP). The RFP is the formal document which communicates the government's performance-based requirements to industry and solicits proposals to satisfy user requirements. SMs must describe new systems in performance-based terms and let the bidders propose the "how-to" details. In writing RFPs, SMs must minimize the use of government MIL-specs and standards which contain overly descriptive process standards that impede access to commercial operations, or which add no value. Military requirements must be written in a way that encourages alternative solutions (e.g., COTS or NDI) and reduces OSD oversight. The RFP must maximize the overlap between DoD needs and commercial capabilities.

5.17. System Requirements Document (SRD). The SRD is part of the RFP. It details the performance-based requirements, critical design requirements, and manufacturing requirements for an item, material, process, or service. The responsible engineering organization prepares the SRD based on the MNS and ORD. The SRD also establishes the criteria by which the government determines whether or not the system meets the performance and design requirements. Contractors use the SRD to develop detailed specifications for the system.

5.18. Contract Data Requirements List (CDRL). The CDRL identifies and describes the content, format, delivery instructions, and approval and acceptance criteria for all deliverable contract data requirements. In preparing the CDRL, the SM will:

- Ensure government testers concur with any test-related deliverable data.

- Ensure government testers are members of the Data Requirements Review Board (DRRB). The DRRB reviews and recommends approval of data requirements for each test program.
- Consult with the OTA to document needed test data requirements.
- Request and review contractor test plans and procedures well before the actual tests to allow time for corrections and modifications.
- Approve contractor test plans prior to the start of test.
- Ensure testers oversee all contractor testing.
- Request the contractor T&E results in time for program decisions.

5.19. Integrated Logistics Support Plan (ILSP). The ILSP is the government's formal planning document for logistics support. It describes the integrated logistics support (ILS) program and includes ILS requirements, tasks, and milestones for the life cycle of the system. The ILSP and ORD are the primary source documents for ILS inputs to the TEMP or SAMP.

5.20. Program Introduction Document (PID). The PID is the initial planning document submitted to DoD major range and test facility bases (MRTFB) to formally request test support. The SM and RTO develop PIDs jointly, starting as soon as general program requirements and schedules are set. SMs usually complete PIDs using the Universal Documentation System Range Commanders Council Document 501-79, or an alternate format approved by the test agency or supporting range.

5.21. Statement of Capability (SOC). The RTO responds with a SOC to a request for test support. The test requester and RTO set a SOC due date depending on the complexity and requirements of the test. The RTO uses the SOC to:

- Accept the test program and provide the specified levels of support.
- Accept prerequisites or constraints for support.
- Provide a preliminary cost estimate.

5.22. Other Formal Agreements.

5.22.1. Memorandum or Letter of Agreement or Understanding (MOA, LOA, MOU). In some instances a PI may not be appropriate for the services or resources required of a particular agency. In those cases, the concerned agencies write an MOA, LOA, or MOU to outline respective tasks and responsibilities. AFI 25-201, *Support Agreement Procedures*, gives guidance on the format and content of these documents.

5.22.2. Host-Tenant Support Agreement (HTSA). RTOs or PTOs prepare HTSAs to delineate base support requirements, and the responsibilities of the host base and the tenant (the test team). These agreements are used when testers plan to use a non-MRTFB location which does not have an established process for granting test support. AFI 25-201 gives guidance on the format and content of these documents.

Chapter 6

DT&E PLANNING

Section A—Beginning Stage

6.1. Supporting the Acquisition Strategy. The DT&E strategy must fully support the selected acquisition strategy while addressing the users' needs. To meet demands for reduced time and cost, modified acquisition strategies such as COTS, NDI, evolutionary, and incremental acquisition are gaining increased emphasis. The user's mission, priorities, operational requirements should also be defined before developing a DT&E test strategy.

6.2. Integrated Product and Process Development (IPPD). IPPD is a management technique that integrates all acquisition activities starting with requirements definition through production, fielding, deployment, and operational support in order to optimize the design, manufacturing, business, and supportability processes. PMs and developmental testers will apply the concept of IPPD throughout the acquisition process to the maximum extent practicable. SMs will maximize the overall performance of the entire acquisition system, not just the performance of individual functional areas, by identifying problems early and maintaining a cooperative spirit of problem resolution. (See DoDD 5000.1 and DoD 5000.2-R)

6.2.1. Integrated Product Teams (IPT). At the core of IPPD are integrated product teams (IPT). The IPT capitalizes on the strengths of all participants working as a team for the overall benefit of the program. A number of IPTs may work simultaneously on various aspects of the acquisition program. For example, the Test Planning Working Group (TPWG) is a

specialized IPT addressing test matters and charged with developing the TEMP. The IPTs report their results up to an overarching IPT (OIPT) which consists of senior decision makers.

6.2.2. **Integrated Test Planning.** The SM will begin an integrated test planning effort to plan for system T&E as early as feasible in the acquisition process. The SM will form IPTs involving all acquisition players (contractors, subcontractors, developmental and operational testers, maintainers, logisticians, and users). The SM will maintain a continuous integrated planning effort using IPTs to implement the test program and adjust planned activities when unexpected circumstances arise. This integrated test planning must consider combined testing whenever practicable.

6.2.3. **Integrated Test Program (ITP).** The SM will develop and follow an ITP approach which integrates all testing in order to:

- Ensure the required resources are available.
- Prevent test duplication through use of a combined DT&E/OT&E approach.
- Properly integrate the DT&E program with the overall acquisition strategy.

6.3. Early DT&E Strategy Planning. The SM must start early when developing a DT&E strategy to support the selected acquisition strategy. Modified acquisition strategies such as evolutionary, incremental, COTS, and NDI are increasingly used to exploit rapidly advancing technologies. The SM should consider DT&E strategies with more combined DT&E/OT&E, earlier tester involvement, and more system contractor testing. DT&E strategies are developed using the systems engineering process.

6.3.1. **What is Systems Engineering.** Systems engineering is both a technical process and a management process. The SM will use the systems engineering process to control the total system development effort, and to achieve an optimum balance of all system elements. Systems engineering is an iterative process which translates operational needs into descriptions of system parameters in the form of specialized program plans and documentation. Typical outputs are the SEMP, TEMP, ILSP, interface control documents, risk analyses and assessments, DT&E test plans, trade studies, design documentation, software development plans, and producibility plans. The SM integrates these documents to optimize overall system effectiveness.

6.3.2. **Role of T&E in Systems Engineering.** The SM will ensure system definition and design reflect the technical requirements for all system elements such as equipment, software, personnel, facilities, and data. Testers will ensure these technical requirements are quantifiable and testable within the time and funding allowed. Testers will identify, define, and set priorities for all required DT&E, identify required test resources, then design, plan for, and conduct experiments to influence system design and verify performance predictions.

6.4. Modeling and Simulation (M&S) During DT&E. Modeling and simulation are integral parts of the test process used to supplement and complement open-air, hardware-in-the-loop, installed system facility testing, measurement facility testing, and integration laboratory testing. The SM is responsible for planning and executing all required M&S support during DT&E. The RTO will support the SM's development and application of standard digital system models (DSM) for the system under test. The RTO will assist in model verification, validation, and accreditation according to AFI 16-1001, *Verification, Validation, and Accreditation*.

6.5. Protecting Critical Information. The SM will plan and provide for the protection of classified and sensitive unclassified information, including information communicated electronically. Radiation or emissions from test instrumentation must be protected within the guidelines of the security classification guide, and international treaties or agreements. The SM and the TPWG will address procedures, resources, and operations security (OPSEC) measures in the TEMP. SMs will ensure programs involving critical technologies or war fighting capabilities have an approved program protection plan before testing begins. This plan will be compared to a test facility's security plan before beginning any test at a facility.

Section B—Developing the Test Concept

6.6. Available Information. Sources for information include the SFTC offices, the test centers, the Air Force Acquisition Model, the users, the Acquisition Logistics Lessons Learned System, and the OT&E Lessons Learned Data Base. When defining DT&E requirements and outlining the DT&E test concept, research available sources for:

- The program's overarching acquisition strategy and T&E strategy.
- Changes to the acquisition strategy.
- Technical information from the Defense Technical Information Center (DTIC).
- Information regarding T&E of comparable systems.
- Lessons learned by previous acquisition personnel.

6.6.1. **Single-Face-to-Customer (SFTC) Office Roles.** The SFTC offices will facilitate early DT&E planning for new programs, major modifications, product improvement programs, and T&E investment planning. The SFTC's goal is to

improve the efficiency and effectiveness of Air Force T&E by assisting customers in the disciplined application of the test process (detailed in the Air Force T&E Process Manuals). The SFTCs also identify risks in the test options available to the customer, and help customers understand the capabilities, limitations, and applications of available resources. Once testers complete early DT&E planning, the SFTC's role diminishes to maintaining cognizance of the program and supporting the RTO. The SFTC and RTO will work closely to ensure a smooth transition.

6.6.1.1. SFTC Offices. Three SFTC offices support the test process:

- Aircraft-Propulsion/Avionics-Electronic Warfare, phone (805) 275-9250 or DSN 525-9250.
- Armament/Weapons-C⁴I, phone (904) 882-9650 or DSN 872-3316.
- Space, (505) 846-6080 or DSN 246-6080.

6.6.1.2. Designating the SFTC. For complex weapon systems where more than one SFTC is involved, the SM must contact HQ AFMC/DO for a lead SFTC designation. All pre-MS 0 acquisition organizations will work with the appropriate SFTC office for early test planning.

6.6.2. The Air Force Acquisition Model (AFAM). The AFAM is a personal computer-based system managed by ASC/SYM (DSN 785-0423). The model identifies and benchmarks the core processes of acquisition management, and communicates best practices and lessons learned. It describes and maps out the entire "cradle-to-grave" acquisition process, incorporating policy changes not yet documented in Air Force Instructions. The AFAM also contains the Air Force Lessons Learned database which contains technical and management lessons learned in the acquisition community.

6.6.3. Automated Test Planning System (ATPS). ATPS is a personal computer-based expert system to guide users through the preparation or review of TEMPs. It provides structured and systematic methods for TEMP preparation, review, and program risk assessment. ATPS improves TEMP consistency, quality, and efficiency, and helps reduce the learning curve for less experienced testers. Copies can be obtained from OSD/DTSE&E(T&E) at DSN 225-7246.

6.6.4. OT&E Lessons Learned Program. HQ AFOTEC's Policy and Procedures Team (AFOTEC/XRX, DSN 246-5242) manages the OT&E Lessons Learned Program. An abstract listing of all OT&E lessons learned is available upon request.

6.7. The DT&E Test Concept. The SM, with advice from the SFTC and RTO, determines the most effective test concept for reducing risk during DT&E. Once formulated, the SM implements the test concept using an integrated test program (ITP) approach.

6.8. Risk Reduction. A major objective of DT&E is the reduction of acquisition risk. To assess and manage risk, SMs, RTOs, and other acquisition managers shall use a variety of techniques, including technology demonstrations, prototyping, and test and evaluation. Risks must be well understood and risk management approaches developed before decision authorities authorize a program to proceed into the next phase of the acquisition process.

6.9. Risk Management Program. The SM will establish a risk management program to be applied throughout the design process. A structured process will be established for reviewing and approving all test plans prior to the conduct of any DT&E. The test plan review process will include thorough technical and safety reviews conducted according to this instruction and AFI 91-202, *The US Air Force Mishap Prevention Program*. Also see DoD 5000.2-R.

6.10. Combined Testing. A combined DT/OT approach will be used to the maximum extent possible. The combined approach must not compromise either developmental or operational test objectives. A final independent phase of OT&E will be required for beyond low-rate initial production decisions. The combined DT&E/OT&E strategy will be directed in the PMD and described in the TEMP.

6.10.1. Order of Combined Testing. The SM will generally conduct DT&E first to answer critical technical or engineering questions, and determine or verify the system's performance envelope. DT&E information may come from contractor-conducted and/or government-conducted tests. Operational assessments (OA) and operational utility evaluations (OUE) may be used to provide early operational user feedback to developers, and as precursors to IOT&E. OT&E personnel will participate in DT&E to familiarize themselves with the system and to review test data as early as possible. As DT&E progresses, developmental and operational test events and data requirements will be combined where possible.

6.10.2. Contractor Involvement in Government Testing. Congressional statute (Title 10 Section 2399) and DoD 5000.2-R place strict limits on the participation of system contractors in OT&E. The SM, RTO, and OTA must ensure any system contractor-generated data used for the combined portions of DT&E/OT&E is protected from tampering, improper collection methods, manipulation, bias, or conflict of interest. The SM must structure the DT&E such that raw data is accurate, objective, and reliable, and make it available to independent testers for independent evaluation.

6.10.3. Responsibility for Combined Test Results. The SM, RTO, and the OTA must take steps to protect contractor DT&E data by playing active, informed roles in test planning and execution. The greater the reliance on contractors for combined test data, the greater the need for oversight by knowledgeable government officials. The number of government officials is

a management decision based on a number of factors such as the technical complexity of the project or its components, the technical qualifications of government officials, and the inspection techniques available. The RTO is ultimately responsible for achieving DT&E objectives, and AFOTEC or the designated OTA is responsible for achieving OT&E objectives, and for evaluating and reporting results independently.

6.10.4. Combined Test Forces (CTF). Formation of a CTF will be directed in program documentation or in detailed memorandums of agreement. All test organizations participating in the CTF will make test resources available under a unified command structure at a single location, or as agreed.

6.11. Contractor and Subcontractor DT&E. DT&E contractual requirements must be consistent with established HQ USAF/TE and AFMC policies, and RTO procedures. The RTO will review all contractor test plans and recommend approval or disapproval to the SM. The SM must approve those plans, procedures, and reports (including the deficiency reporting process) verifying the system or subsystem specifications. The SM will also review all contractor and subcontractor test plans and deficiency reporting processes before approval.

6.12. Test and Evaluation Master Plan (TEMP). The SM and TPWG will document in the TEMP the overarching strategy for test planning, funding, and execution. The TEMP is subject to HQ USAF/TE, OTA, SAF/AQ, and OSD review and approval. If appropriate, a SAMP may be used in lieu of the TEMP (see paragraphs 5.6 and 5.7). DT&E will not start until a TEMP (or SAMP, if appropriate) is approved. Joint programs require multiple Service approval. See DoD 5000.2-R, Appendix III, for details. The TPWG will use the TEMP to:

- Fully integrate the overall program acquisition strategy, test concepts, schedules, funding, and associated documentation.
- Define the critical path to achieving each acquisition milestone.
- Accurately reflect the user's requirements and MOEs, and how they will be tested.
- Provide linkage between operational requirements, system characteristics, critical parameters (performance, cost, and schedule), MOEs used in testing. Show how these support the mission or task the system is to perform.
- Document how testable MOEs and MOPs in the AoA will be addressed during T&E.
- Document RTO, PTO, and OTA responsibilities and key organizational relationships.
- Emphasize the next phase of system acquisition rather than provide an historical account of the program.
- Describe exit criteria documented in the Acquisition Decision Memorandum (ADM) and the Acquisition Program Baseline (APB).
- Document when and how a combined test approach will be used if time and cost savings warrant.
- Document the impacts of test and resource limitations.

6.12.1. TEMP Preparation. The SM will develop and update the TEMP in support of program milestones, program reviews, and other decision points. The SM will use an integrated product team (IPT) approach (e.g., a TPWG) when developing and updating the TEMP. ATPS is available for creating and reviewing TEMPs.

6.12.2. TEMP Content. The TPWG will make the initial TEMP as specific as possible. As the system progresses through its milestones and becomes more clearly defined, the TEMP should become more detailed. However, the TPWG must not allow any areas to remain "to be determined" (TBD) in the DT&E portion of a TEMP past MS I. See DoD 5000.2-R, Appendix III, for details about content and format. The completed TEMP will not exceed 30 pages and represents agreement among all TPWG participants.

6.12.3. Incorporation of the TEMP into a SAMP. Key elements of the TEMP may be incorporated into a SAMP at the discretion of the PM, and with the concurrence of the TPWG. This consolidation will only be done if consistent with common sense and sound business practices. If appropriate, the TEMP may be developed as an annex to the SAMP. As a minimum, the SAMP (or TEMP annex) must capture critical T&E information needed for program execution. All TPWG stakeholders will be included in the SAMP IPT when preparing the T&E portion of the SAMP. More details are contained in the *Single Acquisition Management Plan Guide*, 29 April 1996, available from SAF/AQXA.

6.12.4. TEMP Submittal and Coordination. The SM will submit the TEMP "in parallel" to all organizations represented on the TPWG. Organizations are normally allowed 30 days for coordination, and TEMP due dates are firm. Organizations will not withhold TEMP coordination or approval in an attempt to resolve issues or force solutions. If issues remain unresolved for more than 30 days, the dissenting organization must provide the SM with a position statement or a formal nonconcurrence. When the TEMP cannot be submitted on time, the SM must write to the Air Force approval authority stating the reason for the delay and commit to a new submittal date. TEMP approval authorities will not approve TEMPs without a current MNS, STAR or STA, and ORD.

6.12.4.1. Initial TEMP Submission. SMs will submit initial TEMPs via the program element monitor (PEM) to the PEO or DAC, and the Mission Area Director (MAD). The MAD will coordinate the TEMP through the Director, Air Force Test and Evaluation (HQ USAF/TE), and submit it to the Service Acquisition Executive (SAF/AQ) for Service approval.

6.12.4.2. Submission to OSD. TEMP's requiring OSD approval must be submitted to the PEM 45 days prior to the OSD due date to allow a minimum of 30 days for internal Air Force review, incorporation of comments, and approval. After Service approval, the **draft** TEMP will be submitted to OSD for approval 45 days prior to the MS review; and the **final** TEMP will be submitted 10 days prior to the MS review. Submission to two OSD offices is required: the Director, Test, Systems Engineering and Evaluation (OSD/DTSE&E); and the Director, Operational Test and Evaluation (OSD/DOT&E).

6.12.5. TEMP Updates and Changes. After initial submission, the SM revises the TEMP to support milestones, or to reflect significant changes or breaches in the program. SMs will review their TEMP's annually as part of the PMD cycle. They will submit updates or changes through their PEOs, DACs, and MADs, as appropriate.

6.12.6. Test Planning Working Group (TPWG) Functions. The TPWG is mandatory for major programs and OSD "oversight" programs. The SM forms the TPWG to include a chairperson from the program office and representatives from each organization involved in the test program. TPWG representatives must work together as a cross-functional team for the good of the program. They must be empowered to make decisions for their organizations, be highly knowledgeable in their functional areas, and provide full support in the development and coordination of the TEMP. As a minimum, the following organizations will be represented:

- Program office functional area experts (e.g., contracting, logistics, and T&E).
- Single Face to Customer Office.
- Test agencies (including RTO, PTO, and OTA).
- The Defense Contract Management Command (DCMC).
- Operating command(s).
- Supporting command(s).
- Participating command(s).
- The PEM.
- OSD/DTSE&E and OSD/DOT&E.
- HQ USAF/TEP.
- System contractor(s).
- Support contractor(s).
- Additional representatives (when appropriate):
- Subcontractor(s).
- Federal Aviation Administration (FAA).
- National Aeronautics and Space Administration (NASA).
- Any other organizations involved in the T&E effort.

6.13. Developing the Request for Proposal (RFP).

6.13.1. RFP Special Contract Clauses. Government testers will review the RFP, particularly Section H, to ensure it contains any special clauses necessary for executing the approved test concept. Government testers must also review Section L to ensure test program requirements are properly addressed. If the test concept requires a combined DT&E/OT&E approach, provisions must be included for protecting the quality and integrity of contractor test data for later use during independent OT&E (see paragraphs 6.10 and 2.2.4).

6.13.2. The System Requirements Document (SRD). The SM will involve developmental testers in identifying the T&E required in Section 4 of the SRD, and in developing the verification cross reference matrix. Section 3 of the system specification lists all the system requirements testers must verify, and Section 4 lists the methods testers will use. The RTO, along with the OTA and other test organizations, must ensure the user's requirements are correctly translated into meaningful and testable contractual language.

Section C—Scheduling Time and Resources

6.14. Formulating a Test Program Schedule. The SM will develop the test program schedule for inclusion in the RFP and the TEMP. During the initial planning stages, the SM should develop a top-level, event-driven master schedule. Success-oriented or calendar-driven schedules must be avoided. The SM must get estimates from the contractor on when software, models, prototypes, mockups, etc., will be delivered, and get estimates from the RTO and OTA on the DT&E and OT&E schedules, respectively. With these estimates, the SM will show all test support requirements. To reduce risk, adequate time must be given to DT&E, OT&E, unplanned contingencies, review of DT&E results, and correction of deficiencies discovered during DT&E. As the planning continues and the test program matures, the master schedule will be expanded into detailed schedules.

6.15. Resource Planning. The SM will plan all needed financial resources to complete DT&E objectives according to AFI 65-601, Volume 1, *Budget Guidance and Procedures*.

6.15.1. Test Facilities. The SM will plan to use Air Force facilities first, and then DoD facilities, to the maximum extent possible. See paragraph 2.23 for more details.

6.15.2. Budgeting for Resources. The SM will budget for DT&E, IOT&E test articles, and Type 1 training as required. The OTA will budget for all other OT&E resources, including training not specifically budgeted by the SM. The SM will add program-specific test resources not available, funded, or programmed to the program baseline and includes them in the resources section of the TEMP.

6.15.3. Using Foreign Materiel. If foreign materiel is required as part of the DT&E, the SM and RTO will comply with the foreign materiel requirements outlined in AFI 99-114, *Foreign Material Program*. AFI 99-109, *Test Resource Planning*, provides further guidance.

6.15.4. Test Data Resources. The RTO will identify the various parameters for T&E, and specify what resources are needed to measure, record, process, and track these parameters. Telemetry and encryption requirements will be considered. The SM will evaluate the resource requirements to determine the optimum balance between cost and schedule.

6.15.5. System Security Test Resources. SMs and RTOs must identify system security resources and include them in test planning documents. See AFI 31-101, Volume 1, *The Physical Security Program*.

Section D—Test Support

6.16. Request for Test Support. After consulting with the SFTC, the SM will typically nominate one of the following government agencies (among others) as the responsible test organization (RTO):

- An Air Force Test Center (AEDC, AFDTC, AFFTC).
- An Air Logistics Center (ALC) Flight Test Squadron.
- An Air Force Product Center T&E directorate.

6.16.1. RTO Designation. The RTO is the lead government entity that is qualified and responsible for DT&E. If the PMD does not designate an RTO for DT&E, the SM will contact the appropriate SFTC office for advice. The SFTC office will forward a prioritized list of recommended RTOs to the SM and AFMC/DO, from which the SM will nominate an RTO and forward it to HQ AFMC/DO for approval. HQ AFMC/DO will then designate the RTO and notify SAF/AQ for documentation in the PMD. During the development of a system, a program may need several RTOs, but only one will be the lead RTO for a specific test program element at any given time. Although contractors are not eligible to be RTOs, some RTO tasks may be delegated to them in the SOW.

6.16.2. Alternative Designation Procedures. If there are compelling reasons for not selecting one of the RTOs from the SFTC's list, the SM will forward justification for an alternate to AFMC/DO. HQ AFMC/DO will be the decision authority and officially designate the RTO. The T&E Mission Element Board will be the final arbiter for any further disagreements about RTO selection.

6.17. Personnel Training. The SM, RTO, and OTA will articulate any unique or special training requirements needed for test personnel early in the planning process. Personnel must complete training in time to perform testing. The SM will include appropriate training requirements in the statement of work (SOW) portion of the RFP.

6.18. DT&E Plans. The number and complexity of DT&E plans needed for an acquisition effort is determined by the nature of the system and the types of testing required. Most DT&E plans are either management plans or detailed test plans, all of which are outlined in the ITP.

6.18.1. Detailed Test Plans (DTP). DTPs describe specific tests and how they will be conducted. Contractors, subcontractors, the SPO, the RTO, the PTO, the OTA, and other test agencies will develop DTPs for all testing regimens. Contractors should design DTPs to satisfy the verification requirements of the SOW and RFP. The SM will develop DTPs to demonstrate or verify contractor compliance with contract specifications and performance-based requirements. Operational testers will develop DTPs to verify operational effectiveness and suitability requirements stated in the ORD. *AFPAM 99-116, Test and Evaluation Management Guide*, provides an outline for preparing, coordinating, and revising a DTP.

6.18.2. Integrated Logistics Support (ILS) Planning. The SM ensures the test program evaluates the logistical aspects of systems using the ILSP. The SM also integrates testing of the ILS elements into the overall schedule. The ILS manager will participate in DT&E and OT&E planning by developing detailed ILS test objectives and MOEs for each acquisition or modification phase.

6.19. Technical and Safety Reviews. Government test plans and test support missions are subject to separate technical and safety reviews by independent government test personnel. Reviews will be conducted as necessary for commercial or

non-government systems tested in DoD T&E facilities or when DoD assets are used. Test organizations must establish and publish procedures for determining when and how these reviews will be accomplished. The review process could be as simple as a series of individual reviews for simple tests, to a formal Technical Review Board (TRB) and/or Safety Review Board (SRB) for complex tests with elevated risk levels.

6.19.1. Technical Review Board (TRB). The TRB assesses the soundness of system designs and test plans. Technically qualified personnel with test management experience, but who are independent of the test program, will perform these reviews.

As a minimum, technical reviews will:

- Evaluate test requirements, techniques, approaches, and objectives.
- Assess and reduce test risk.

6.19.2. Safety Review Board (SRB). The SRB assesses whether the test plan has identified and mitigated all safety hazards, and whether adequate plans exist to eliminate or mitigate risks. At the recommendation of the SRB, the SM and RTO will eliminate or mitigate hazards caused by the operation of the system, system design deficiencies, and potential unsafe acts or procedural errors. RTOs will set up procedures for controlling and supervising tests consistent with the risk involved and according to local range safety criteria. See AFI 91-202, *The US Air Force Mishap Prevention Program*.

6.19.3. Nonnuclear Munitions Safety Board (NNMSB). The NNMSB will review and approve all live munition expenditures and test events (including explosive devices such as initiators and fuses). AFI 91-205 discusses the NNMSB.

6.19.4. Determination of Risk. During safety reviews, safety personnel will establish safety risk levels according to MIL-STD-882. Testing organizations, including R&D laboratories, will implement a safety review process according to this standard. The safety process will include how to route all PI documents through the safety office when developing the SOC.

6.20. Certification of System Readiness for Dedicated OT&E. The certification process provides a structured mechanism for identifying and reducing risks associated with transitioning from DT&E to OT&E. The SM, with the concurrence of the "certifying official," will tailor the certification process to meet the needs of the acquisition program. The SM, RTO, OTA, PTO, operating command(s), and other supporting commands will participate in the process according to AFMAN 63-119.

6.20.1. Starting Early. SMs will implement the certification process as early as practical for all ACAT programs which plan for dedicated OT&E. The certification process is a continuous effort, not a single event in time, and is not tied to any particular acquisition milestone. However, final certification for dedicated OT&E must be done a minimum of 30 days prior to the planned start of dedicated OT&E.

6.20.2. Certifying Officials. The PEO, DAC, or equivalent official is the "certifying official" for assigned programs. In some cases, the SM may be the certifying official. The certifying official will determine the broad scope and requirements for certifying system readiness to begin the dedicated phase of OT&E.

6.21. Software Testing. During DT&E, testers will set quantitative and demonstrable performance objectives for software, and structure the testing to demonstrate software has reached a level of maturity appropriate for each phase.

6.22. T&E Support Aircraft. On the advice of the RTO, field commanders will review and approve the use of chase aircraft to support Air Force and contractor testing (see AFI 16-402, *Aerospace Vehicle Assignment, Distribution, Accounting, and Termination*).

Chapter 7

CONDUCTING AND ANALYZING TESTS

Section A—Getting Ready To Test

7.1. The Integrated Test Plan. RTOs will execute DT&E according to the approved integrated test plan (ITP) and detailed test plans (DTP). The SM is responsible for the overall test program and must keep abreast of all contractor, RTO, and PTO test efforts. The RTO will designate a DT&E test director for all government tests who will control the DT&E test team and associated resources.

7.2. Test Readiness Reviews (TRR). The SM will conduct TRRs before executing a test event to ensure test procedures comply with test plans, and test requirements will be accomplished. The TRR's goal is to satisfy senior commanders that:

- The system is ready for testing.

- Pretest analysis has predicted test results.
- Test personnel are completely prepared for the test.
- Known anomalies have not increased the risks associated with executing the test.
- All reasonable efforts have been made to minimize risk.
- Test results will provide the appropriate inputs for evaluation of the tested system.

7.3. Preparing the Test Team. The SM or DT&E test director will fully brief all DT&E test team members and support personnel on the test program, and will ensure training is sufficient to conduct the test. This preparation will include discussions of:

- The test program and its objectives.
- The test items.
- Methods for conducting the tests.
- Program schedules and major milestones.
- Team members' responsibilities.
- Mishap reporting.
- Safety for personnel and systems.
- Environmental protection.
- Data requirements.
- Data collection and analysis procedures.
- The deficiency reporting system (as outlined in TO 00-35D-54).
- Responsibilities for preparing the DT&E report.

Section B—Executing Tests and Evaluations

7.4. RTO Execution of Test and Evaluation. The RTO will use the scientific method and the test process to execute tests by:

- Conducting pretest analysis and risk analysis to refine test scenarios, identifying critical test points, and predicting system performance.
- Conducting test sequences under progressively more strenuous test conditions.
- Processing test data and analyzing the results.
- Matching test results to pretest predictions and modifying models prior to future tests.
- Modifying test articles and prototypes as needed to fix identified deficiencies.
- Evaluating test results to determine system operational effectiveness and suitability.

7.5. Managing Data During Test Conduct. The DT&E test director will establish data quality control and accountability procedures. The RTO is responsible for acquiring, monitoring, controlling, and assuring the quality of test data. The RTO will ensure the smooth flow of test data to those responsible for data processing, analysis, and evaluation.

7.5.1. Validating Data. The DT&E test team will continuously assess test data to ensure it correctly represents the variables it is supposed to characterize, and whether the data adequately supports the objectives in the DT&E test plan. This data will be used to modify existing models, or create new models for pretest analysis predictions.

7.5.2. Reducing and Analyzing Data. The DT&E test team will sort and evaluate the data in order to answer specific test objectives. The process of validating and analyzing data will be concurrent with test execution. The test team will continually determine if they have associated the correct data with the right MOEs and MOPs, and that planned analytical techniques are working. The test director will ensure all data reduction tools are available and operationally verified prior to active testing.

7.5.3. Joint Reliability and Maintainability Evaluation Team (JRMET). The SM will establish a JRMET to assist in the collection, analysis, verification, and categorization of R&M data during DT&E and OT&E. A representative from the program office will chair the JRMET. The JRMET will include representatives from the RTO, PTO, OTA, operating command, contractor (non voting), and other participating commands and agencies. The JRMET will establish a common database from which members can independently evaluate the data according to their needs.

7.5.4. Test Data Scoring Board (TDSB). The TDSB compiles, reviews, and scores all available R&M data. The SM will establish a TDSB and designate a chairperson from the program office during DT&E and OT&E. The TDSB is a government-only group which includes representatives from the RTO, PTO, OTA, operating command, and other participating commands and agencies.

7.5.5. Disposing of Test Data. Test directors will maintain original data to allow for additional analysis, if necessary. Otherwise, they will dispose of data according to AFI 37-138, *Records Disposition--Procedures and Responsibilities*.

7.5.6. Pre-Test and Post-Test Briefings. During test conduct, the test director will conduct a briefing before each test event to inform test team members of previous results and upcoming tests. After the test event is complete, test team members will debrief the test director on test outcome and whether the required data was collected.

7.6. Monitoring Tests.

7.6.1. Monitoring Contractor Testing. The SM and RTO will monitor testing conducted by contractors. The SM, RTO, and OTA must ensure any contractor-generated data used for the combined portions of DT&E/OT&E is protected from tampering, improper collection methods, manipulation, bias, or conflict of interest. The greater the reliance on contractors for combined test data, the greater the need for oversight by knowledgeable government officials. The number of government officials is a management decision based on a number of factors such as the technical complexity of the project or its components, the technical qualifications of government officials, and the inspection techniques available. Include monitoring requirements in appropriate provisions of the SOW and the contract.

7.6.2. Monitoring Technical Reviews, Design Reviews, and Audits. During these events, the SM and government testers will examine the contractor's approach to test problems, evaluate the validity of the test processes, and evaluate the accuracy of the contractor's results. If government personnel find discrepancies, they will inform the SM for appropriate action. The SM will ensure personnel always document observations and findings for future reference.

7.6.3. Monitoring Government-Conducted Testing. The SM will closely monitor government-conducted testing and stay involved with all RTO activities related to the program. The amount of SM involvement depends on the items tested, their complexity, costs, expected test results, funding, and so forth. The RTO must develop procedures for conducting tests at a level appropriate to the risk. The SM will ensure the RTO performs the tests and analyzes the data using the agreed-upon test procedures.

7.7. Mishap Accountability. Mishap accountability will be clearly established prior to conducting tests. The RTO must account for aircraft, drone, missile, explosive, and ground mishaps, nuclear accidents and incidents, and safety deficiencies as specified in AFI 91-204, *Investigating and Reporting US Air Force Mishaps*, or as established in an MOA between the involved agencies. The RTO or PTO will send a copy of each MOA to HQ AFMC/DO no later than 10 days before beginning tests.

Chapter 8

TEST AND EVALUATION REPORTING

8.1. General Information. Test and evaluation reports play an important role in the decision-making process for weapon systems acquisition. They must be timely, factual, concise, accurate, and complete. The SM and RTO will establish the frequency and content of reports early in the test planning process. Test and evaluation reports will:

- Provide test results in support of program management decisions.
- Assess the capabilities and limitations of weapon systems under development.
- Provide historical documentation of weapon system development.
- Document test techniques, procedures, and data analysis.
- Provide information for Air Force Technical Orders.
- Capture lessons learned.

8.2. Distributing and Safeguarding Test Reports.

8.2.1. Before Milestone Decisions. The SM will provide DT&E reports on oversight programs in sufficient time before MS II and III reviews. **Draft** DT&E reports are due to OSD/DTSE&E, the PEO, DAC, and HQ USAF/TE 59 days before the DAB review. **Final** DT&E reports are due to the PEO, DAC, HQ USAF/TE, and OSD/DTSE&E 33 days before DAB reviews. DT&E briefings to Air Force principals may also be directed.

8.2.2. SIGINT and COMSEC Reports. The SM will coordinate distribution of signals intelligence (SIGINT) and COMSEC final reports with NSA, and provide permanent file copies to HQ AFIC/IMQF, San Antonio TX 78243-5000.

8.2.3. Control of Reports. The reporting requirements in this Instruction are exempt from licensing according to AFI 37-124, *The Information Collections and Reports Management Program*.

8.3. Types of DT&E Reports. DT&E reports come from contractors and government organizations. The SM documents the requirements for contractor test reports in the contract. Contractor T&E reports will contain information similar to Air

Force-prepared technical T&E reports (see AFPAM 99-116, *Test and Evaluation Management Guide*). Air Force-developed DT&E reports are categorized as:

- Quick look reports.
- Progress reports.
- Annual interim reports.
- Preliminary reports of results.
- Technical reports (or final reports).
- Technical letter reports.
- End of Test Phase report.

8.4. End of Test Phase Report. Normally, the RTO will submit DT&E reports at the end of each test phase. However, when a program has an extended test phase, the RTO will also provide annual interim reports. The SM will send final DT&E reports to the PEM, the OTA, the participating MAJCOMs, and DTIC. For ACAT I and II programs, and programs on OSD oversight, the PEM will send a copy to OSD/DTSE&E and OSD/DOT&E. DT&E reports are not releasable to non-government agencies without prior approval and coordination of the SM.

8.5. Deficiency Reporting. Deficiencies will be reported throughout the acquisition program as necessary to ensure proper problem identification, tracking, and corrective action. DRs will be reviewed during the certification process in preparation for dedicated OT&E. End of DT&E reports prepared by the SM will include:

- A prioritized list and status of all open category I (CAT I) DRs, and the top ten CAT II DRs in accordance with TO 00-35D-54.
- An action plan for DR resolution.
- An assessment of how each DR affects system operation and life cycle costs.

8.6. Reporting Lessons Learned. The Air Force Lessons Learned Program portion of AFAM gives SMs, engineers, users, and other acquisition system personnel the necessary feedback on results of past design and acquisition decisions. All participants will record lessons learned as they occur. Contact the Acquisition Model System Program Office (ASC/CYM, DSN 785-0423) for procedures on how to submit lessons learned.

8.7. Certification of System Readiness for Dedicated OT&E. The SM will prepare required documentation to assist the certifying official (PEO, DAC, or equivalent official) certify the system ready for dedicated OT&E. The SM will prepare a certification message summarizing the critical areas and processes accomplished, and discuss any agreed-upon limitations to OT&E. See AFMAN 63-119 for details. The certification message will serve as a quantifiable benchmark of projected capabilities against which to check OT&E results.

8.8. Disposition of Test Assets. Test assets (e.g., instrumentation, data automation equipment, test articles) from canceled or completed test programs will be properly disposed of as follows:

- Catalogued and turned over to other RDT&E programs or sustainment programs.
- Refurbished and reassigned to operational use or inventory.
- Turned over to the nearest Defense Reutilization Management Office.

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Director, Test and Evaluation

GLOSSARY OF REFERENCES, ABBREVIATIONS, ACRONYMS, AND TERMS

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AFPD 21-3, *Technical Orders*

AFPD 21-4, *Engineering Data*

AFI 21-102, *Depot Maintenance Management*

AFI 21-109, *Communications Security Equipment Maintenance and Maintenance Training*

AFI 21-115, *Product Quality Deficiency Report Program* (formerly AFR 74-6)

AFI 25-201, *Support Agreement Procedures*

AFI 31-101, Vol 1, *The Physical Security Program*

AFI 31-401, *Managing the Information Security Program*

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AFI 99-102, *Operational Test and Evaluation*
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NOTE: The user of this instruction is responsible for verifying the currency of the cited documents.

Abbreviations and Acronyms

ACAT—acquisition category
ACTD—advanced concept technology demonstration
ADM—Acquisition Decision Memorandum
ADP—automated data processing
AETC—Air Education and Training Command
AFAE—Air Force Acquisition Executive
AFAM—Air Force Acquisition Model
AFCA—Air Force Communications Agency
AFI—Air Force Instruction
AFMC—Air Force Materiel Command
AFOTEC—Air Force Operational Test and Evaluation Center
AFPAM—Air Force Pamphlet
AFPD—Air Force Policy Directive
AIS—automated information system
AoA—analysis of alternatives (formerly COEA)
APB—Acquisition Program Baseline
ATPS—Automated Test Planning System
C4—command, control, communications, and computers
C4I **intelligence**—command, control, communications, computers, and
CDRL—contract data requirements list
CJCS—Chairman of the Joint Chiefs of Staff
CJCSI—Chairman of the Joint Chiefs of Staff Instruction
COEA—cost and operational effectiveness analysis (replaced by AoA)
COI—critical operational issue
COMSEC—communications security
CONOPS—Concept of Operations
COTS—commercial off-the-shelf
CRWG—Computer Resources Working Group
CSAF—Chief of Staff of the Air Force
CSCI—computer software configuration item
CTF—combined test force
DAB—Defense Acquisition Board
DAC—designated acquisition commander
DCMC—Defense Contract Management Command
DIA—Defense Intelligence Agency
DoD—Department of Defense
DoDD—Department of Defense Directive
DoDI—Department of Defense Instruction

DOT&E—Director, Operational Test and Evaluation
DR—deficiency report
DRRB—Data Requirements Review Board
DSM—digital system model
DT&E—developmental test and evaluation
DTIC—Defense Technical Information Center
DTP—detailed test plan
DTSE&E—Director, Test, Systems Engineering and Evaluation
EA—evolutionary acquisition
e.g.—*exempli gratia*, meaning “for example”
EMD—engineering and manufacturing development
EOA—early operational assessment
EW—electronic warfare
FAA—Federal Aviation Administration
FAT—first article testing
FCT—Foreign Comparative Test
FMS—Foreign Military Sales
FOA—Field Operating Agency
FOT&E—Follow-On Operational Test And Evaluation
FY—Fiscal Year
GFE—government furnished equipment
HOI—Headquarters Operating Instruction
HITL—hardware-in-the-loop
HTSA—host-tenant support agreement
IASP—Integrated Acquisition Strategy Panel
ICBM—intercontinental ballistic missile
ILS—integrated logistics support
ILSP—Integrated Logistics Support Plan
IMI—industrial and maintenance inspection
IOC—initial operational capability
IOT&E—initial operational test and evaluation
IPPD—integrated product and process development
IPS—Integrated Program Summary
IPT—integrated product team
ISE—integrated system evaluation
ISTF—installed system test facility
ITP—integrated test plan
IV&V—independent verification and validation
IWSM—integrated weapon system management
JCS—Joint Chiefs of Staff
J-MASS—Joint Modeling and Simulation System
JRMET—Joint Reliability and Maintainability Evaluation Team
JSIMS—Joint Simulation System
JT&E—joint test and evaluation
JWARS—Joint Warfare System
LAT—lot acceptance test
LFT—live fire test
LFT&E—live fire test and evaluation
LOA—letter of agreement
LTWG—Logistics Test Working Group
LT&E—logistics test and evaluation
LRIP—low rate initial production
LSA—logistics support analysis
MAIS—major automated information system
MAJCOM—major command
MCOTEA—Marine Corps Operational Test and Evaluation Agency

MDA—milestone decision authority
MDAP—major defense acquisition program
MEB—Mission Element Board
MIPRB—Material Improvement Program Review Board
MNS—Mission Need Statement
MOA—memorandum of agreement
MOE—measure of effectiveness
MOP—measure of performance
MOU—memorandum of understanding
MRTFB—Major Range and Test Facility Base
MS—milestone
M&S—modeling and simulation
NASA—National Aeronautics and Space Administration
NBC—nuclear, biological and chemical
NDI—nondevelopmental item
NNMSB—Nonnuclear Munitions Safety Board
NSA—National Security Agency
OA—operational assessment
OAR—open-air range
O&M—operations and maintenance
OIPT—overarching integrated product team
OMB—Office of Management and Budget
OPR—office of primary responsibility
OPSEC—operations security
OPTEC—Operational Test and Evaluation Command
OPTEVFOR—Operational Test and Evaluation Force
ORD—Operational Requirements Document
O&M—operations and maintenance
O&S—operations and support
OSD—Office of the Secretary of Defense
OTA—operational test agency
OT&E—operational test and evaluation
PAT—production acceptance test
P3I—preplanned product improvement
PEM—program element monitor
PEO—program executive officer
PID—Program Introduction Document
PM—program manager
PMD—program management directive
POC—point of contact
POM—Program Objective Memorandum
PPQT—preproduction qualification test
PQT—production qualification test
PTO—participating test organization
QOT&E—qualification operational test and evaluation
QT&E—qualification test and evaluation
RCM—Requirements Correlation Matrix
R&D—research and development
RDT&E—research, development, test, and evaluation
RFP—request for proposal
R&M—reliability and maintainability
RTO—responsible test organization
SAE—service acquisition executive
SAF—Secretary of the Air Force
SAMP—Single Acquisition Management Plan
SECDEF—Secretary of Defense

SEMP—System Engineering Management Plan
SFTC—Single-Face-to-Customer office
SIGINT—signals intelligence
SIL—system integration laboratory
SIMVAL—simulator validation
SM—single manager
SMM—System Maturity Matrix
SOC—Statement of Capability
SOW—statement of work
SPO—system program office
SRB—Safety Review Board
SRD—System Requirements Document
SSE—systems security engineering
S&T—science and technology
STA—System Threat Assessment
STAR—System Threat Assessment Report
T&E—test and evaluation
TBD—to be determined
TDSB—Test Data Scoring Board
TLR—technical letter report
TEMP—Test and Evaluation Master Plan
TO—technical order
TPWG—Test Planning Working Group
TRB—Technical Review Board
TRR—Test Readiness Review
VV&A—verification, validation, and accreditation

Terms

NOTE: Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms*, 1 Dec 1989, and AFM 11-1, *Air Force Glossary of Standardized Terms*, contain standardized terms and definitions for DoD and Air Force use.

Acquisition Category (ACAT)—Acquisition categories determine the level of review, decision authority, and applicable procedures. They facilitate decentralized decision making and execution, and compliance with statutorily imposed requirements. There are three ACATs based on research, development, test, and evaluation (RDT&E) and/or procurement costs stated in FY 96 dollars:

- **ACAT I** programs are major defense acquisition programs (MDAP) requiring eventual expenditure for RDT&E of more than \$355 million, or procurement of more than \$2.135 billion.
- **ACAT II** programs are major programs requiring eventual expenditure for RDT&E of \$140 million, or procurement of more than \$645 million.
- **ACAT III** programs are those programs not meeting the requirements for ACAT I or ACAT II programs.
 - There are two sub-categories of ACAT I programs:
 - **ACAT ID** means the program is subject to Defense Acquisition Board (DAB) oversight, and the Milestone Decision Authority (MDA) is USD(A&T).
 - **ACAT IC** means the MDA is the component head, or Service Acquisition Executive (SAE).
 - **ACAT IA** programs are major automated information systems (MAIS) requiring program costs for any single year in excess of \$30 million, total program costs in excess of \$120 million, or total life-cycle costs in excess of \$360 million, or those designated by ASD(C3I) to be ACAT IA.
 - There are two sub-categories of ACAT IA programs:
 - **ACAT IAM** means the MDA is ASD(C3I).
 - **ACAT IAC** means the MDA is the component DAC.

Acquisition Community—All personnel involved in the conceptualization, initiation, design, development, test, contracting, production, deployment, sustainment, logistics support, modification, and disposal of weapon and other systems, supplies, or services to satisfy DoD needs, and intended for use in or in support of military missions.

Acquisition Decision Memorandum (ADM)—A memorandum signed by the milestone decision authority documenting the decisions made and the exit criteria established as the result of a milestone decision review or in-process review. (DoD Acquisition Deskbook)

Acquisition Phases—The logical parts of an acquisition program, separated by milestone decision points, during which broadly stated mission needs are progressively translated into well-defined system-specific requirements. The number of phases shall be tailored to meet the specific needs of individual acquisition programs. The four acquisition phases are:

- Concept Exploration.
- Program Definition and Risk Reduction.
- Engineering and Manufacturing Development.
- Production, Fielding/Deployment, and Operational Support.

Acquisition Process—The system of discrete, logical phases separated by major decision points called milestones. The acquisition process begins when broad mission needs are identified which cannot be satisfied with non-materiel solutions. AFI 63-101.

Acquisition Program Baseline (APB)—A succinct document that details cost, schedule, and performance (including support) parameters, and program breach information. It establishes the commitment between the program manager and the Milestone Decision Authority (AFI 63-101).

Acquisition System—A single uniform system whereby all equipment, facilities, and services are planned, designed, developed, tested, acquired, maintained, and disposed of within the DoD. The system encompasses establishing and enforcing policies and practices that govern acquisitions, to include documenting mission needs and establishing performance goals and baselines; determining and prioritizing resource requirements for acquisition programs; planning and executing acquisition programs; directing and controlling the acquisition review process; developing and assessing logistics implications; contracting; monitoring the execution status of approved programs; and reporting to Congress. See DoDD 5134.1, *Under Secretary of Defense (Acquisition & Technology)*.

Advanced Concept Technology Demonstration (ACTD)—A means of rapidly demonstrating the use of mature technologies to address urgent military needs. ACTDs are designed to rapidly transfer technology from developers to users. Demonstrations are jointly developed and implemented with the operational user and development communities as key participants. The fundamental goals are to provide a sound basis for investment decisions, and provide residual operational capabilities. ACTDs are funded by OSD.

Automated Information System (AIS)—Combination of computer hardware and software, data, or telecommunications, that performs functions such as collecting, processing, transmitting, and displaying information. Excluded are computer resources, both hardware and software, that are: physically part of, dedicated to, or essential in real time to the mission performance of weapons systems. (DoDD 5000.1)

Availability (Ao)—A measure of the degree to which an item is in the operable and committable state at the start of a mission when the mission is called for at an unknown (random) time.

Combined Test Force (CTF)—An integrated T&E product team empowered to evaluate a weapon system by collocating its major members at one primary test site. The requirements, resources, test objectives, and leadership of various test efforts are integrated to achieve higher levels of efficiency. As a minimum, representatives from the DT&E and OT&E communities, contractors, and operating commands will be members.

Combined Testing—Testing conducted by the developmental and operational testers when there are clear cost and/or schedule advantages. The high cost or lack of sufficient test articles may provide an overall benefit for DT&E and OT&E teams to share test resources and data. Combined testing usually ends with a phase of dedicated OT&E.

Commercial-off-the Shelf. Any item that is:—

- Commercially available in the marketplace.
- Any previously developed item of supply that is in use by a department or agency of the United States, a state or local government, or a foreign government with which the United States has a mutual defense cooperation agreement.
- Any of the above items that requires only minor modification to meet the requirements of the procuring agency.
- Any of the above items of supply that is currently being produced but is not yet in use or is not yet available in the commercial marketplace (DoD 5000.2-R and Title 41 U.S.C. 403).
- Any nondevelopmental item (NDI).

Compatibility—The capability of two or more items or components of equipment or material to exist or function in the same system or environment without mutual interference (CJCSI 6212.01A).

Concurrency—The production of a system while developmental activities are still ongoing. The risk in concurrency is that of producing a large number of units, the configuration of which might later prove to be ineffective or unsuitable.

Covered System—A vehicle, weapon platform, or conventional weapon system that includes features designed to provide some degree of protection to users in combat; and that is a major system (10 U.S.C. 2366). A term used to describe the systems which must undergo LFT&E.

Critical Operational Issue (COI)—A key question that must be examined in operational test and evaluation to determine the system's capability to perform its mission. Testers normally phrase a COI as a question to be answered in evaluating a system's operational effectiveness or suitability.

Defense Acquisition Deskbook—An automated repository of information consisting of an electronic Desk Reference Set, a Tool Catalog, and a Forum for the exchange of information. The Reference Set organizes information into two main categories: mandatory guidance; and discretionary information.

Deficiency—A condition that prevents successful mission accomplishment, or degrades a system's operational effectiveness or suitability (TO 00-35D-54).

Deficiency Report (DR)—The report used to identify, document, and track system deficiency and enhancement data while a system is in advanced development, T&E, or operational transition (TO 00-35D-54).

Designated Acquisition Commander (DAC)—The individual who functions as the milestone decision authority (MDA) on programs not assigned to a PEO. The commanders of product centers and air logistics centers act in this capacity. DACs, like PEOs, are accountable to the Service Acquisition Executive (SAE) (AFPD 63-1).

Developmental Test and Evaluation (DT&E)—Test and evaluation conducted to evaluate design approaches, validate analytical models, quantify contract technical performance and manufacturing quality, measure progress in system engineering design and development, minimize design risks, predict integrated system operational performance (effectiveness and suitability) in the intended environment, and identify system problems (or deficiencies) to allow for early and timely resolution or correction. DT&E may include contractor testing (AFPD 99-1).

Director, Test, Systems Engineering and Evaluation (DTSE&E)—The focal point in the Office of the Secretary of Defense for DT&E and the T&E infrastructure, including the Major Range and Test Facility Base.

Early Operational Assessment (EOA)—An operational assessment conducted before or at MS II (DoD Acquisition Deskbook). An EOA assesses the most promising design approach sufficiently early in the acquisition process to assure it has the potential to fulfill user requirements. Also see operational assessment.

Evaluation Criteria—Standards by which accomplishments of required technical and operational effectiveness and/or suitability characteristics or resolution of operational issues may be addressed (DoD Acquisition Deskbook).

Evolutionary Acquisition (EA)—An acquisition strategy in which a core capability is fielded, and the system design has a modular structure and provisions for future upgrades and changes (increments) as requirements are refined. This strategy is well suited to high technology and software intensive programs where requirements beyond a core capability can generally, but not specifically, be defined. The evolutionary acquisition strategy differs from incremental acquisition because the total functional capability is not completely defined at program inception, but evolves as the system is built.

Exit Criteria—A set of specific accomplishments that must be satisfactorily demonstrated before a program progresses further in the current acquisition phase, or transitions to the next acquisition phase. Exit criteria may include such factors as critical test issues, the attainment of projected growth curves and baseline parameters, and the results of risk reduction efforts. Exit criteria supplement minimum required accomplishments and are specific to each acquisition phase (DoD Acquisition Deskbook).

First Article—The preproduction models, initial production samples, test samples, first lots, pilot models, and pilot lots.

First Article Test (FAT)—The T&E of first production articles for conformance with specified contract requirements before or during the initial stage of production. FATs are conducted on each item in a production lot. They are repeated when the process or design changes significantly, or when a different production source is brought on line.

Foreign Comparative Test (FCT)—A OSD-funded program that allows each Service to test foreign-developed systems, components, equipment items, or technologies. The goal is to determine if foreign items meet validated needs and requirements, and if they are viable candidates for a competitive acquisition. (See AFI 99-114)

Hardware-in-the-Loop (HITL)—Testing that involves system or subsystem hardware in an open or closed-loop mode against high fidelity targets and threat simulations. It allows testers to test developmental and production systems under controllable, repeatable, non-destructive conditions.

Hazard Control—Methods used to reduce the probability or severity of potential mishaps. The precedence of control is: eliminate or reduce hazard risk through design change; incorporate safety devices; incorporate warning devices to detect and alert personnel of hazardous conditions; and, least acceptable, develop procedures and training to minimize the probability of mishaps.

Implementing Command—The lead command or agency designated by the Service Acquisition Executive to manage an acquisition program.

Incremental Acquisition—An acquisition strategy which develops and deploys systems or functionality through a number of clearly defined increments that stand on their own. The number, size, and phasing of all increments must be defined for the total system. This strategy is most appropriate when user requirements are well understood and easily defined, but a phased approach is more prudent or beneficial.

Independent Verification and Validation (IV&V)—The conduct of verification and validation of a model or simulation by individuals or agencies that did not develop the model or simulation.

Industrial and Maintenance Inspection (IMI)—IMIs are sustainment related inspections and quality checks performed to verify completeness and accuracy of established repair or production processes, including acceptance testing and failure investigations which are not necessarily associated with production or repair. *Note: IMI activities are non-T&E activities which do not follow the test process guidance.*

Initial Operational Test and Evaluation (IOT&E)—The operational test and evaluation conducted on production or production-representative articles to help decide whether to proceed beyond low-rate initial production. IOT&E is conducted to estimate how well the system attains operational effectiveness and suitability (DoD 5000.2-R).

Integrated Logistics Support (ILS)—A composite of all support considerations necessary to ensure the effective and economical support of a system for its life cycle. A disciplined, unified, and iterative approach to the management and technical activities necessary to:

- Integrate the needed level of support into system and equipment design.
- Develop support requirements that consistently relate to readiness objectives, to design, and to other support requirements.
- Get the required support.
- Give the required support during the operational phase at a minimum cost.

Integrated Logistics Support Plan (ILSP)—An Air Force management plan for the integrated logistics support (ILS) process. This plan includes ILS elements that are integrated with each other and also with program planning, engineering, designing, testing, and evaluation during production and operation. It integrates support elements with the mission elements of a system throughout its life cycle. (DoD 5000.2-R/Air Force Supplement 1)

Integrated Program Summary (IPS)—A DoD component document prepared and submitted to the MDA at MS reviews. It succinctly states the status of a program and its readiness to proceed to the next phase of the acquisition cycle (DoD 5000.2-R).

Integrated Weapon System Management (IWSM)—A management concept that integrates all life-cycle management activities of a system under one manager. IWSM entails “cradle-to-grave” or “seamless” management. The acquisition process, sustainment, FMS, and international cooperative activities are under the IWSM architecture. See AFMC Pamphlet 800-60, *Integrated Weapon System Management Guide*.

Integration—The arrangement of systems in an architecture so that they function together in an efficient and logical way (CJCSI 6212.01A).

Integration Laboratories—Test facilities that use real-time digital models of electronic combat and avionics systems to evaluate software and hardware concepts, technologies, components, systems, and entire avionics suites in a controlled environment.

Interoperability—The ability of systems, units, or forces to provide services to and accept services from other systems, units, or forces and to use these services to help them operate effectively together. The conditions achieved among communications-electronics systems or items of communications-electronics equipment when information or services can be exchanged directly and satisfactorily between them and/or their users (CJCSI 6212.01A).

Joint Program—Any defense acquisition system, subsystem, component, or technology program involving formal management or funding by more than one DoD component during any phase of a system's life cycle.

Joint Reliability and Maintainability Evaluation Team (JRMET)—The team responsible for collecting, analyzing, and categorizing R&M data during DT&E and OT&E. It is chaired by the SPO and includes representatives from the supporting and operating commands, the DT&E and OT&E test teams, and, when appropriate, system contractor personnel as nonvoting members.

Joint Test and Evaluation (JT&E)—JT&E programs evaluate technical or operational concepts which are applicable to more than one Service. JT&E candidate programs are nominated by the Services, and directed and funded by OSD. They never result in the acquisition of systems.

Lot Acceptance Test (LAT)—The T&E of first production articles for conformance with specified contract requirements before or during the initial stage of production. LATs are conducted on a random sample taken from each production lot. They are repeated when the process or design changes significantly, or when a different production source is brought on line.

Lead Service—The Service designated by USD(A&T) to be responsible for management of a system acquisition involving two or more DoD components in a joint program.

Lethality—The ability of a munition system (or laser, high power microwave, etc.) to cause damage that results in the loss or degradation of the ability of a target system to complete its designated mission(s) (DoD 5000.2-R, Appendix IV).

Life Cycle Cost—The total cost to the Government of acquisition and ownership of a system over its useful life. It includes the cost of development, acquisition, support and, where applicable, disposal (DoD Acquisition Deskbook).

Live Fire Test (LFT)—A test within the OSD approved LFT&E strategy involving the firing of actual munitions at target components, subsystems, subassemblies, or system-level targets (which may or may not be configured for combat) to examine personnel casualty, vulnerability and/or lethality issues (DoD 5000.2-R, Appendix IV).

Logistics Supportability—The degree to which the planned logistics support allows the system to meet its availability and wartime usage requirements. Planned logistics support includes the following: test, measurement, and diagnostic equipment; spare and repair parts; technical data; support facilities; transportation requirements; training; manpower; software (DoD Acquisition Deskbook).

Logistics Test and Evaluation (LT&E)—The test methodology, criteria, and tools for evaluating and analyzing the ten Integrated Logistics Support (ILS) elements as they apply to a system under test. The objective is to influence the design through applying the ILS elements as early as possible in the acquisition cycle. LOG TEST integrates the evaluation and analysis efforts of R&M, human factors engineering, and logistics test, and is an integral part of the DT&E report.

Low-Rate Initial Production (LRIP)—The minimum number of systems (other than ships and satellites) to provide production representative articles for operational test and evaluation, to establish an initial production base, and to permit an orderly increase in the production rate sufficient to reach full-rate production upon successful completion of operational testing (DoD Acquisition Deskbook).

Maintainability—The ability of an item to be retained in or restored to a specified condition when maintenance is performed by personnel having specified skill levels, using prescribed procedures and resources, at each prescribed level of maintenance and repair (DoD Acquisition Deskbook).

Major Automated Information System (MAIS)—An AIS acquisition program that is (1) designated by ASD(C3I) as a MAIS, or (2) estimated to require program costs in any single year in excess of \$30 million in FY 1996 constant dollars, total program costs in excess of \$120 million in FY 1996 constant dollars, or total life-cycle costs in excess of \$360 million constant dollars. MAISs do not include highly sensitive classified programs (as determined by SECDEF). See DoD Acquisition Deskbook.

Major Defense Acquisition Program (MDAP)—An acquisition program that is not a highly sensitive classified program (as determined by SECDEF) and that is: (1) designated by USD(A&T) as an MDAP; or (2) is estimated by USD(A&T) to require an eventual total expenditure for RDT&E of more than \$355 million in FY 1996 constant dollars, or for procurement, of more than \$2.135 billion dollars in FY 1996 constant dollars. See DoD Acquisition Deskbook and 10 U.S.C. 2430. An ACAT I program.

Major System—A combination of elements that will function together to produce the capabilities required to fulfill a mission need. The elements may include hardware, equipment, software, or any combination thereof, but excludes construction or other improvements to real property. A system shall be considered a major system if it is estimated by USD(A&T) to require an eventual total expenditure for RDT&E of more than \$75 million in FY 1980 constant dollars (approximately \$140 million in FY 1996 constant dollars), or for procurement of more than \$300 million in FY 1980 constant dollars (approximately \$645 million in FY 1996 constant dollars). See DoD Acquisition Deskbook and 10 U.S.C. 2302(5). An ACAT II program.

Measure of Effectiveness (MOE)—A qualitative or quantitative measure of a system's performance or a characteristic that indicates the degree to which it performs the task or meets a requirement under specified conditions. Where possible, MOEs should be defined to measure operational capabilities in terms of engagement or battle outcomes (AFI 10-601).

Measure of Performance (MOP)—A quantitative measure of the lowest level of physical performance (e.g., range, velocity, payload). (AFI 10-601).

Measurement Facilities—Test resources used for exploring and evaluating EW technologies. Data collected from these resources include antenna patterns, radar cross sections, and infrared and laser signatures.

Milestone (MS)—A decision point separating the phases of an acquisition program requiring OSD or DoD component program review or both. Milestones include both Defense Acquisition Board (DAB) and equivalent program reviews for DoD components. The four milestones are:

- Approval to Conduct Concept Studies
- Approval to Begin a New Acquisition Program
- Approval to Enter Engineering and Manufacturing Development
- Production or Fielding/Deployment Approval

Milestone Decision Authority (MDA)—The individual designated according to criteria established by USD(A&T), or by ASD(C3I) for AIS programs, to approve entry of an acquisition program into the next phase (DoD Acquisition Deskbook).

Mission Need Statement (MNS)—A document prepared by users to identify a requirement for a materiel solution to satisfy a mission deficiency (DoD 5000.2-R and AFI 10-601). The MNS is prepared according to CJCS MOP 77.

Modification—A change to a system that is still in production. A "major modification" is a modification that in and of itself meets the criteria of an ACAT I or II, or is designated as such by the MDA.

Multiservice Test and Evaluation—Test and evaluation (T&E) conducted by two or more DoD components for systems to be acquired by more than one DoD component, or T&E of a DoD component's systems that must be interoperable with another DoD component.

Nondevelopmental Item (NDI). NDIs are:—

- Any item commercially available in the marketplace.
- Any previously developed item of that is in use by a department or agency of the United States, a state or local government, or a foreign government with which the United States has a mutual defense cooperation agreement.
- Any of the above items that requires only minor modification to meet the requirements of the procuring agency.
- Any of the above items of supply that is currently being produced but is not yet in use or is not yet available in the commercial marketplace (DoD 5000.2-R and Title 41 U.S.C. 403).
- Any commercial-off-the-shelf (COTS) item.

Objective—

- An operationally significant increment above the threshold. An objective value may be the same as the threshold when an operationally significant increment above the threshold is not identifiable or useful (CJCS MOP 77 and AFI 10-601).
- That value desired by the user and which the SM is contracting for or otherwise attempting to obtain. The objective value could represent an operationally meaningful, time critical, and cost effective increment above the threshold for each program parameter. Program objectives (parameters and values) may be refined based on the results of the preceding program phase(s) (DoD 5000.2-R).

Operating Command—The command primarily operating (using) a system, subsystem, or item of equipment. Generally applies to those operational commands or organizations designated by HQ USAF to conduct or participate in operations or operational testing (AFI 10-601). Often interchanged with the terms "user" or "using command."

Operational Assessment (OA)—An evaluation of operational effectiveness and suitability made by an independent operational test activity, with user support as required, on other than production systems. Testers may conduct OAs at any time using technology demonstrators, prototypes, mockups, engineering development models, or simulations, but they may not substitute an OA for the independent OT&E necessary to support full production decisions (DoD Acquisition Deskbook).

Operational Effectiveness—The overall degree of mission accomplishment of a system used by representative personnel in the environment planned or expected (e.g., natural, electronic, threat) for operational employment of the system which considers organization, doctrine, tactics, survivability, vulnerability, and threat (including countermeasures and initial nuclear weapons effects, nuclear, biological, and chemical [NBC] contamination threats) (DoD Acquisition Deskbook).

Operational Requirements Document (ORD)—

- A formatted statement containing performance and related operational parameters for the proposed concept or system (CJCS MOP 77).
- A document prepared by the operating command that describes quantitative and qualitative performance, operation, and support parameters, characteristics, and requirements for a specific candidate weapon system. Its mandatory attachment is the requirements correlation matrix (RCM) (AFI 10-601).

Operational Suitability—The degree to which a system can be placed satisfactorily in field use with consideration given to availability, compatibility, transportability, interoperability, reliability, wartime usage rates, maintainability, safety, human factors, manpower supportability, logistics supportability, natural environmental effects and impacts, documentation, and training requirements (DoD Acquisition Deskbook).

Operational Test Agency (OTA)—

- Each Service has one designated operational test agency: the Air Force has the Air Force Operational Test and Evaluation Center (AFOTEC); the Navy has the Operational Test and Evaluation Force (OPTEVFOR); the Army has the Operational Test and Evaluation Command (OPTEC); and the Marine Corps has the Marine Corps Operational Test and Evaluation Agency (MCOTEA).
- The command or agency designated in the PMD or other appropriate program directive as responsible for managing the independent OT&E of a system.

Operational Test and Evaluation (OT&E)—Testing and evaluation conducted in as realistic an operational environment as possible to estimate the prospective system's operational effectiveness and operational suitability. In addition, OT&E provides information on organization, personnel requirements, doctrine, and tactics. It may also provide data to support or verify material in operating instructions, publications, and handbooks (AFM 11-1).

Operations Security (OPSEC)—A process of identifying critical information and analyzing friendly actions attendant to military operations and other activities to:

- Identify those actions that hostile intelligence systems can observe.
- Determine indicators hostile intelligence systems might obtain that could be interpreted or pieced together to derive critical information in time to be useful to adversaries.

- Select and execute measures to eliminate or reduce to an acceptable level the vulnerability of friendly actions to exploitation by adversaries (JCS PUB 1-02).

Oversight Program—An acquisition program on OSD's Annual T&E Oversight List which is jointly published by DOT&E and DTSE&E. Generally, the list includes ACAT I (MDAP) programs, ACAT II (major system) programs, and any other program designated for T&E oversight. The master list designates oversight for three types of testing: DT&E; OT&E; and LFT&E. These programs require some additional documentation, and have additional review and approval requirements. See DoD 5000.2-R for details.

Participating Command—A HQ USAF-designated command or agency that takes an active part in developing a system, and supports and advises the SM. The supporting command is also a participating command AFI 10-601).

Participating Test Organization (PTO)—A test organization required to afford specific resources during DT&E.

Phase. —See acquisition phase.

Preplanned Product Improvement (P3I)—A phased acquisition approach that incrementally satisfies operational requirements in order to address the cost, risk, or relative time urgency of different elements of the system being developed. The deferred elements are developed in parallel or subsequent efforts. P3I includes enhancements planned for ongoing systems that go beyond the current performance envelope.

Preproduction Qualification Test (PPQT)—The formal contractual tests that ensure design integrity over the specified operational and environmental range. These tests usually use prototype or preproduction items manufactured to the proposed production design specifications and drawings. PPQTs include contractual reliability and maintainability demonstration tests required prior to production release.

Production Article—An article that is in final form, employs standard parts (or nonstandard parts approved by the agency concerned), and is representative of final equipment.

Production Qualification Tests (PQT)—A technical test conducted after MS III to ensure manufacturing processes, equipment, and procedures are effective. These tests are conducted on a number of samples taken at random from the first production lot, and are repeated if the manufacturing process or design is changed significantly, or when a second source is brought on line.

Program Management Directive (PMD)—The official Air Force document used to direct acquisition or modification responsibilities to the appropriate MAJCOM, PEO, or DAC for a specific system and subsystem's development, acquisition, concept direction study, or modification. The PMD states the program's unique requirements, goals, and objectives, especially those to be met at each acquisition milestone or program review (HOI 800-2).

Prototype—A model used to evaluate design, performance, and production potential (Joint Pub 1-02). The Air Force also uses prototypes during development of a technology or acquisition program for verification or demonstration of technical feasibility. Prototypes may not be representative of the final production item.

Qualification Operational Test and Evaluation (QOT&E)—The operational testing performed on programs instead of IOT&E for which there is no RDT&E-funded development effort.

Qualification Test and Evaluation (T&E)—The testing performed on systems, and on modifications to existing systems, for which there is no RDT&E-funded development effort (AFPD 99-1).

Reliability—The ability of a system and its parts to perform its mission without failure, degradation, or demand on the support system (DoD Acquisition Deskbook).

Requirement—The validated need of an operational user. Initially expressed in broad operational capability terms in the format of a MNS. It progressively evolves to system-specific performance requirements in the ORD (CJCS MOP 77).

Requirements Correlation Matrix (RCM)—A three-part matrix spreadsheet used to provide an audit trail of system capabilities and characteristics identified in the ORD. It lists thresholds and objectives; identifies user recommended key performance parameters; provides supporting rationale justifying each threshold; and preserves rationale for changes in requirements as the system matures (AFI 10-601).

Research, Development, Test and Evaluation (RDT&E)—

- The type of funding appropriation (3600) intended for research, development, test and evaluation efforts. See DoD 7000.14-R, Vol 2A, *Financial Management Regulation*, and AFI 65-601, Vol I, *Budget Guidance and Procedures*.
- The term "research and development" (R&D) broadly covers the work performed by a government agency or the private sector. "Research" is the systematic study directed toward fuller scientific knowledge or understanding of a subject area. "Development" is the systematic use of the knowledge and understanding gained from research for the production of useful materials, devices, systems, or methods. R&D includes the supporting test and evaluation activities, to include IOT&E.

Responsible Test Organization (RTO)—The lead government entity that is qualified and responsible for DT&E.

Risk.—A subjective assessment made regarding the likelihood or probability of not achieving a specific objective by the time established with the resources provided or requested. It also refers to overall program risk (DoD Acquisition Deskbook).

Single-Face-to-Customer (SFTC) Office—One of three single points of contact providing comprehensive up-front planning assistance to test organizations. Organized around mission areas rather than the test centers, these offices facilitate early T&E planning for new programs, major modifications, P3Is, and T&E investment planning. The three SFTCs are: Airframe-Propulsion/Avionics-Electronic Warfare; Space; and Armament/Munitions-C⁴I.

Single Manager (SM)—A government official (military or civilian) who is responsible and accountable for decisions and overall management (to include all cost, schedule, performance, and sustainment) of a system, product group, or materiel group. Also known as system program director, program manager, product group manager, or materiel group manager (AFMC Pamphlet 800-60).

Specification—There are many types of “specifications.” A document intended primarily for use in procurement which clearly and accurately describes the essential technical requirements for items, materials, or services, including the procedures by which it will be determined that the requirements have been met. Also called military specifications.

Specification, Performance-Based—Under acquisition reform, new systems must be described in performance terms, letting bidders propose the “how to” details. Performance-based specifications describe only “what” is needed and eliminate “how to” information. Only form, fit, and function descriptions are given; detailed configuration management controls and production baseline descriptions are left to the contractor. Also known as commercial item descriptions or nongovernment standards.

Supporting Command—The command (usually Air Force Materiel Command) responsible for providing logistics support for a system (AFI 21-102).

Survivability—The capability of a system and crew to avoid or withstand a man-made hostile environment without suffering an abortive impairment of its ability to accomplish its designated mission. Its components are susceptibility and vulnerability.

Susceptibility—The degree to which a weapon system is open to effective attack due to one or more inherent weaknesses. (Susceptibility is a function of operational tactics, countermeasures, probability of enemy fielding a threat, etc.) Susceptibility is considered a subset of survivability (DoD 5000.2-R, Appendix III).

Sustainment—Activities that sustain systems during the operations and support phases of the system life cycle. Sustainment activities include any investigative test and evaluation (T&E) which extends the useful military life of systems, or expands the current performance envelope or capabilities of fielded systems. Sustainment activities also include T&E for modifications and upgrade programs, and may disclose system or product deficiencies and enhancements that make further acquisitions necessary. The T&E conducted during sustainment follows the same guidance in this AFI as for the DT&E conducted during the acquisition process.

System Engineering Management Plan (SEMP)—A concise, top-level management plan for the integration of all system design activities. It forms the basis for comprehensive T&E planning. The SEMP defines and describes the type and degree of system engineering management, the system engineering process, and the integration of related engineering programs.

System Maturity Matrix (SMM)—An acquisition management tool used to aid management in tracking a program's technical progress and risks. The SMM links user requirements and system specifications with anticipated T&E results. It provides a metric for program monitoring and reporting so true progress toward verification of capabilities and requirements can be assessed. The SMM is coordinated with the user and OTA, and approved by the PEO or DAC. The SMM is not a substitute for a valid requirements document.

Threshold.—

- The minimum acceptable operational value for a system capability or characteristic below which the utility of the system becomes questionable. A minimum acceptable operational value for a system capability or characteristic which, in the user's judgment, is necessary to provide an operational capability that will satisfy the mission need (CJCS MOP 77 and AFI 10-601).
- The minimum acceptable value which, in the user's judgment, is necessary to satisfy the need. If threshold values are not achieved, program performance is seriously degraded, the program may be too costly, or the program may no longer be timely. The spread between objective and threshold values shall be individually set for each program based on the characteristics of the program (e.g., maturity, risk) (DoD 5000.2-R).

Upgrade—A change to a system that is out of production.

User—See operating command.

Using Command—See operating command.

Verification, Validation & Accreditation (VV&A)—(1) *Verification*: The process of determining that a model implementation accurately represents the developer's conceptual description and specifications. (2) *Validation*: The process of determining (a) the manner and degree to which a model is an accurate representation of the real-world from the perspective of the intended uses of the model, and (b) the confidence that should be placed on this assessment. (3) *Accreditation*: The official certification by users that a model or simulation is acceptable for use for a specific purpose. VV&A is a continuous process in the life cycle of a model as the model gets upgraded or is used for different applications.

Vulnerability—The characteristics of a system which causes it to suffer a definite degradation (loss or reduction of capability to perform its designated mission) as a result of having been subjected to a certain (defined) level of effects in an unnatural (man-made) hostile environment. Vulnerability is considered a subset of survivability.